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Deschamps

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(54) **VEHICLE**

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(73) Assignee: **YAMAHA MOTOR MANUFACTURING CORPORATION OF AMERICA**, Newnan, GA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(22) Filed: **Jun. 24, 2014**

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(51) **Int. Cl.**
B62D 21/18 (2006.01)
B62D 25/16 (2006.01)
B62D 31/00 (2006.01)

(52) **U.S. Cl.**
CPC ***B62D 21/183*** (2013.01); ***B62D 25/16*** (2013.01); ***B62D 31/003*** (2013.01)

(58) **Field of Classification Search**
CPC B62D 21/183; B62D 25/16; B62D 31/003
See application file for complete search history.

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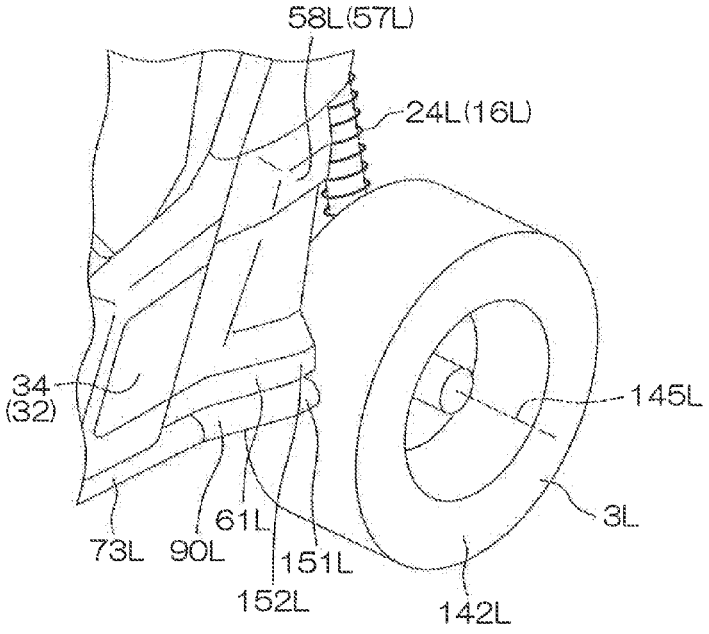
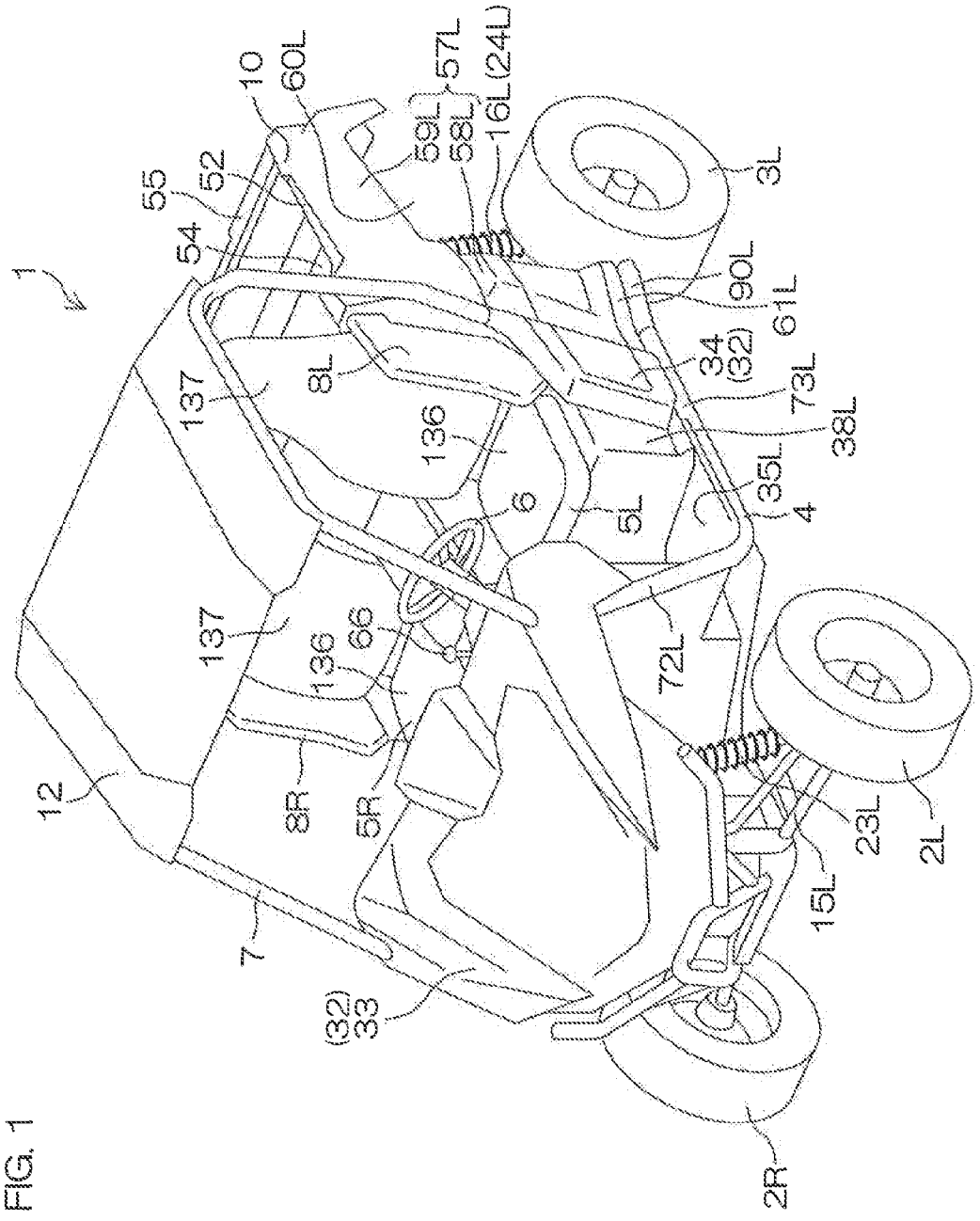
(57) **ABSTRACT**

A vehicle includes a left front wheel and a right front wheel, a left rear wheel and a right rear wheel, and a frame that rotatably supports the wheels. The frame includes a left frame portion and a right frame portion each extending in a front-back direction, a left protruded portion that protrudes to the left from the left frame portion, forward of the left rear wheel, and a right protruded portion that protrudes to the right from right frame portion, forward of the right rear wheel. In a front view, from outside to inside, the left rear wheel, the left protruded portion, and the left front wheel are arranged in this order. In the front view, from outside to inside, the right rear wheel, the right protruded portion, and the right front wheel are disposed in this order.

26 Claims, 16 Drawing Sheets

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90L
61L
34
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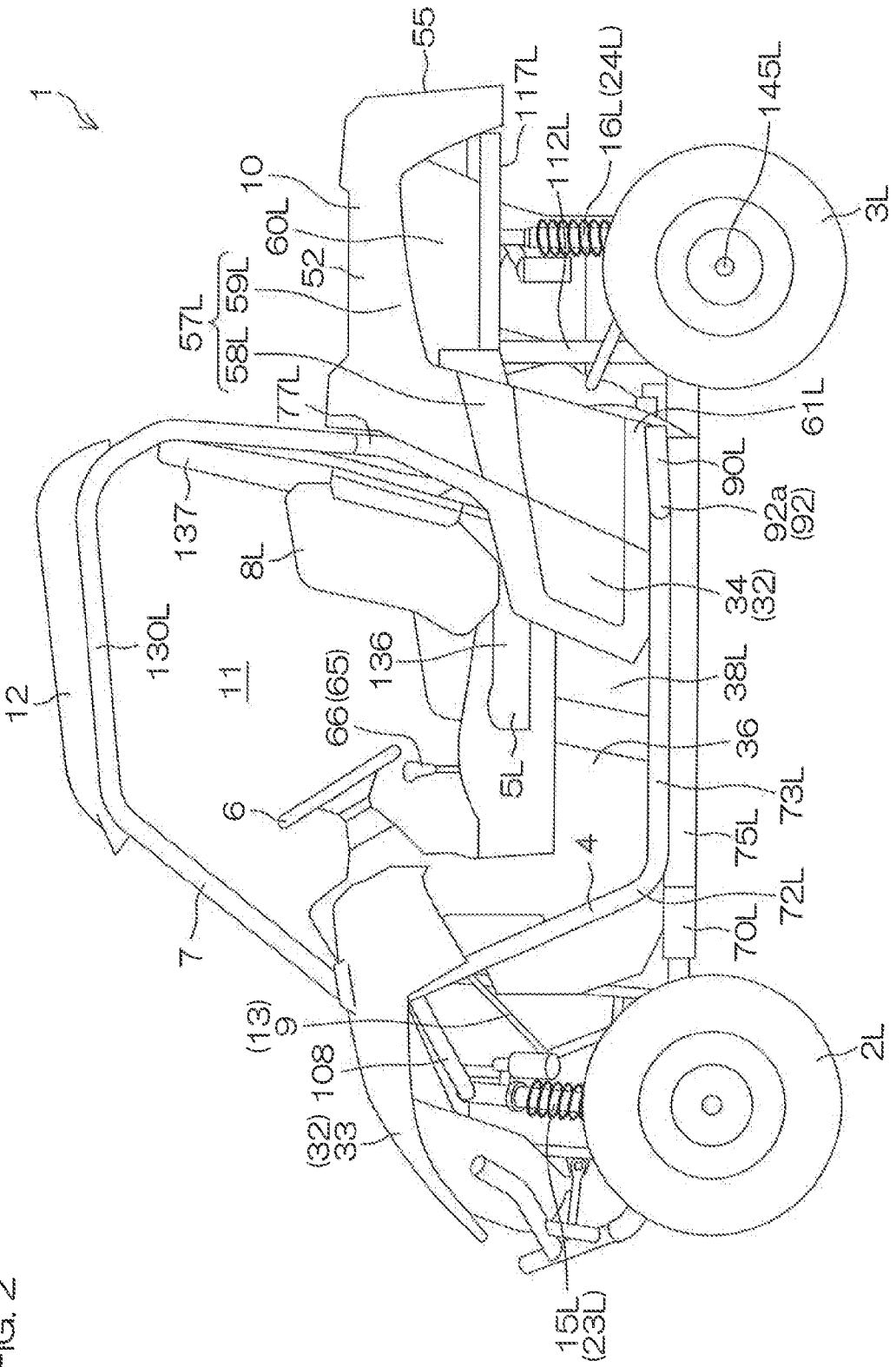
137
8L
136
6
5L
35L
4
137
136
66
72L
12
8R
5R
23L
2L
15L
7
(32)
33
2R

FIG. 1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(92)
137
8L
34
(32)
130L
11
136
66(65)
38L
36
12
5L
73L
75L
72L
70L
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4
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9
108
(32)
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2L
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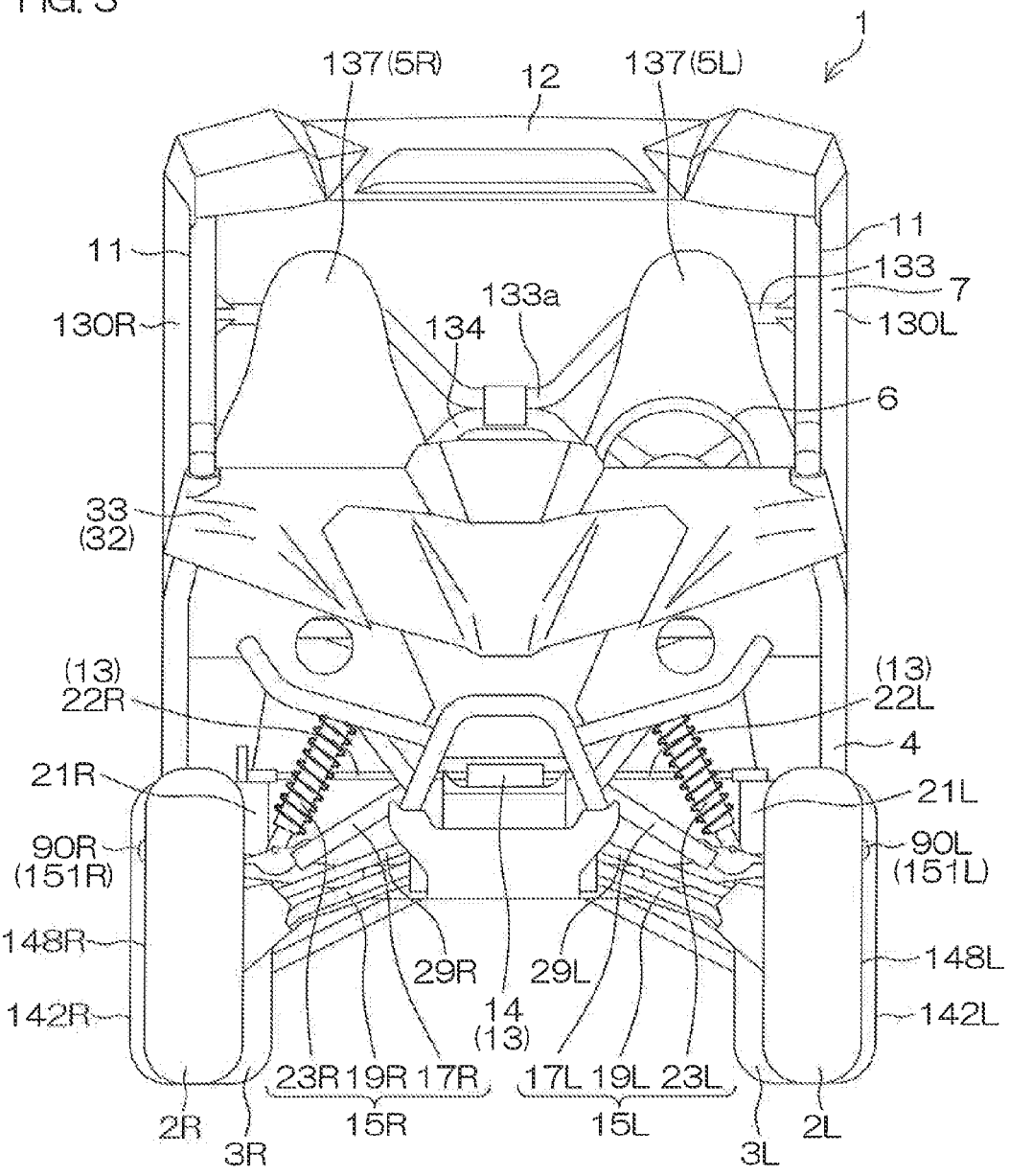
FIG. 2

FIG. 3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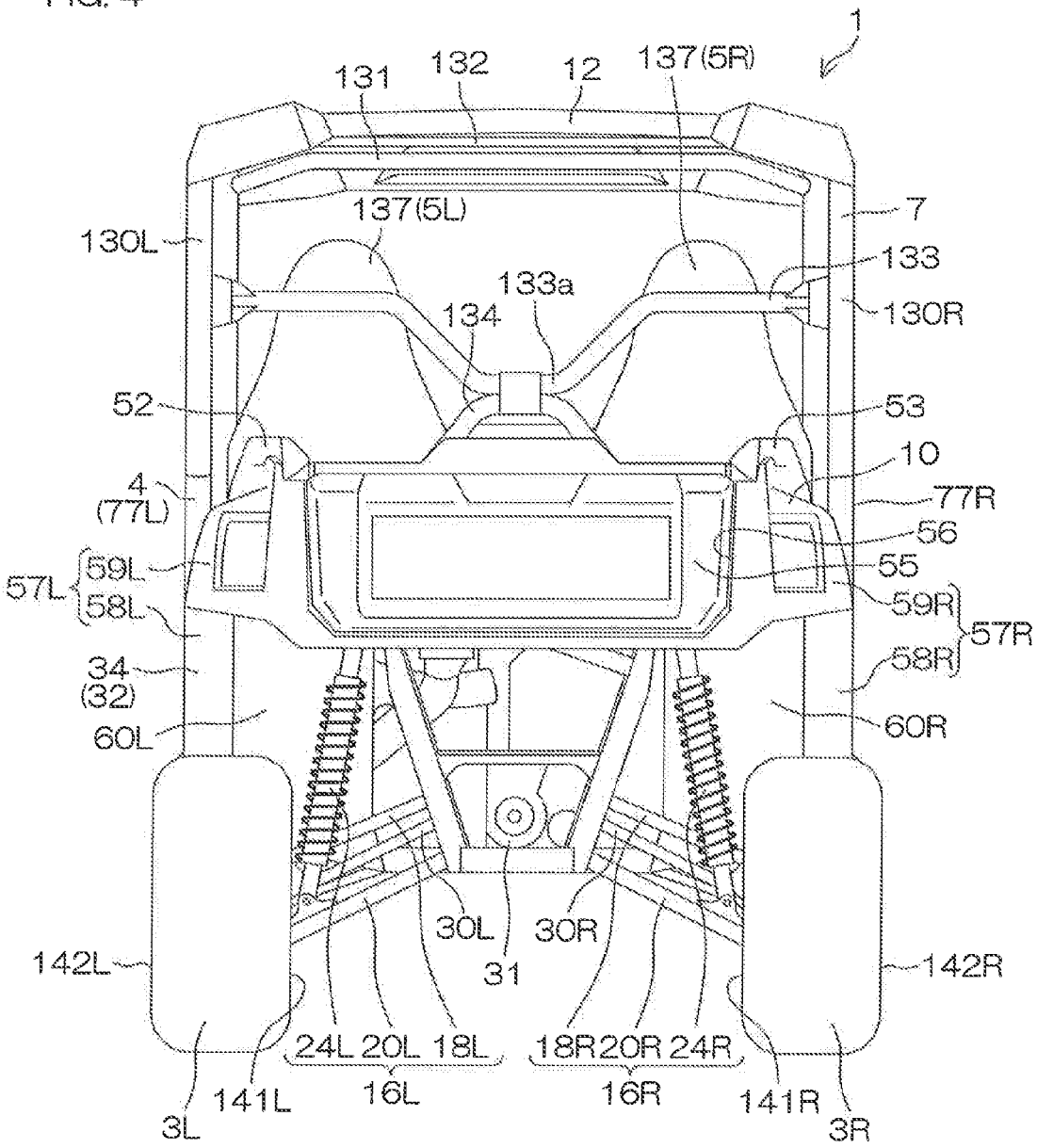
137(5L)
11
11
133
7
133a
130R
134
130L
6
33
(32)
(13)
22R
(13)
22L
4
21R
21L
90R
(151R)
90L
(151L)
148R
148L
29R
29L
142R
142L
14
(13)
23R 19R 17R
17L 19L 23L
2R
3R
15R
15L
3L
2L

FIG. 4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137(5R)
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58L
59R
57R
58R
34
(32)
60L
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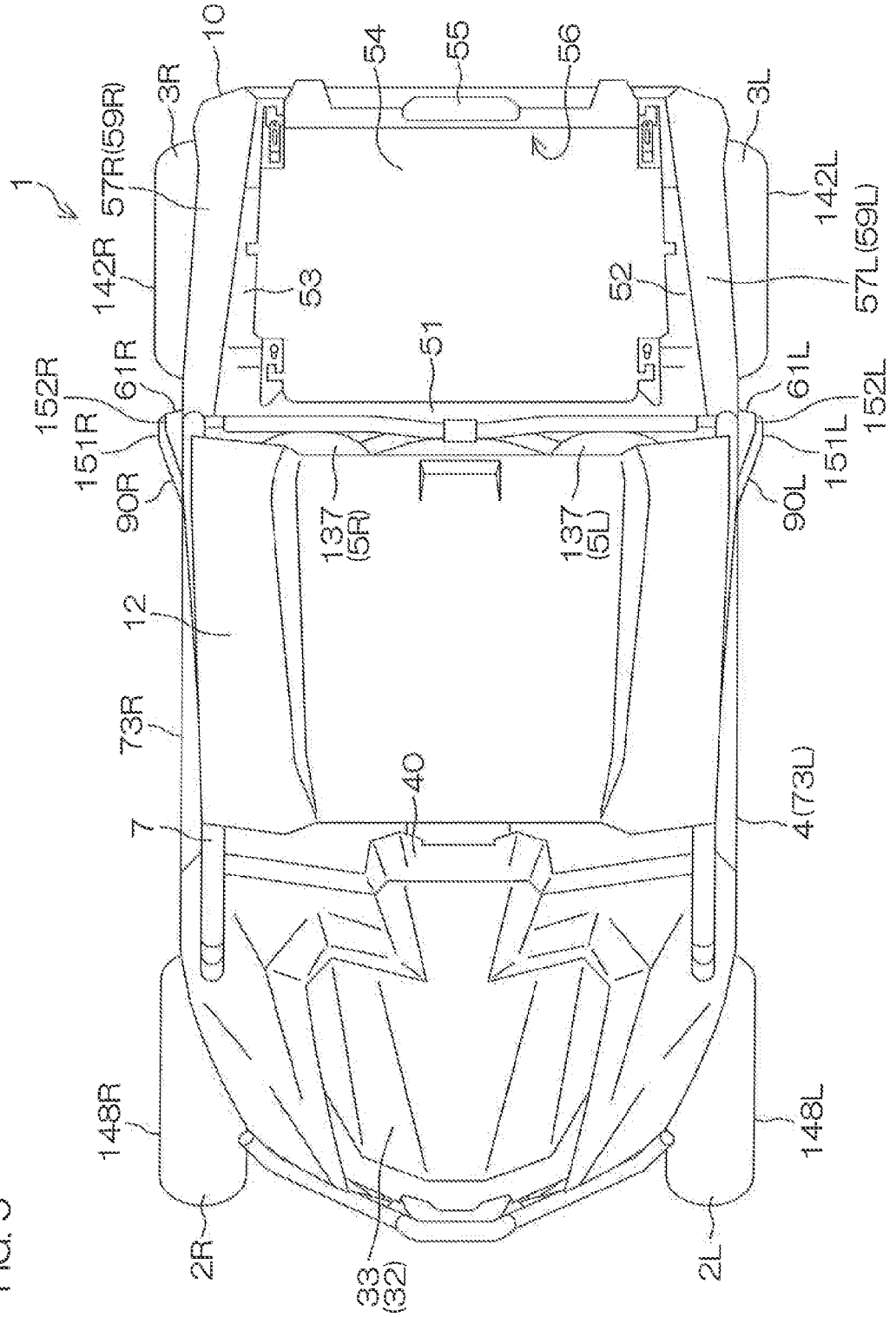
141L
141R
3L
3R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54
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56
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142L
57L(59L)
142R
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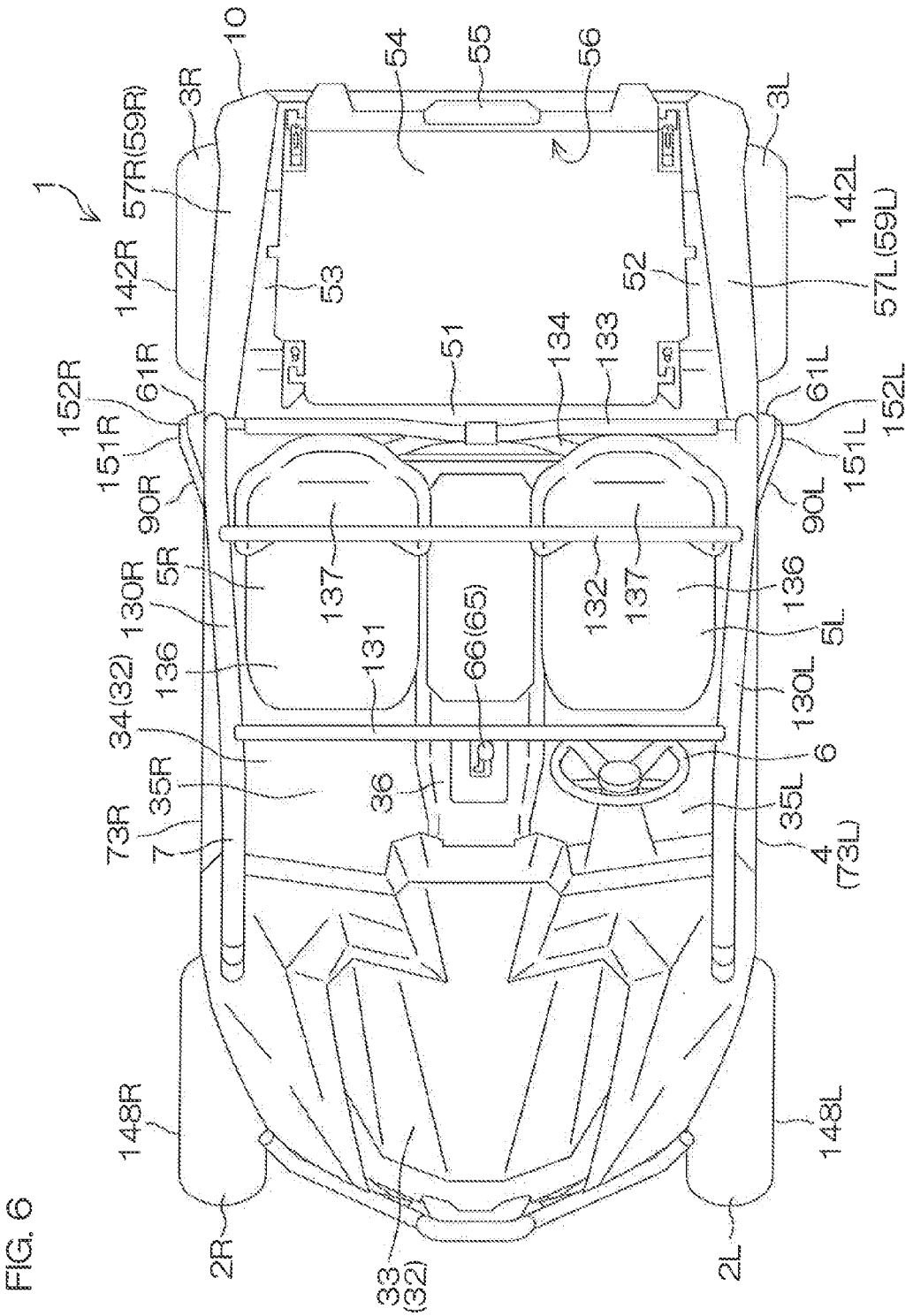
51
12°
5°
61R
61L
152R
152L
151R
151L
90R
90L
137 (5R)
137 (5L)
12
73R
40
7
4(73L)
148R
148L
2R
2L
33 (32)

FIG. 5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142L
57L(59L)
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61L
152L
151R
151L
90R
90L
5R
5L
130R
130L
137
131
66(65)
132
136
34(32)
6
35R
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36
73R
7
4
(73L)
148R
148L
2R
2L
33
(32)

FIG. 6

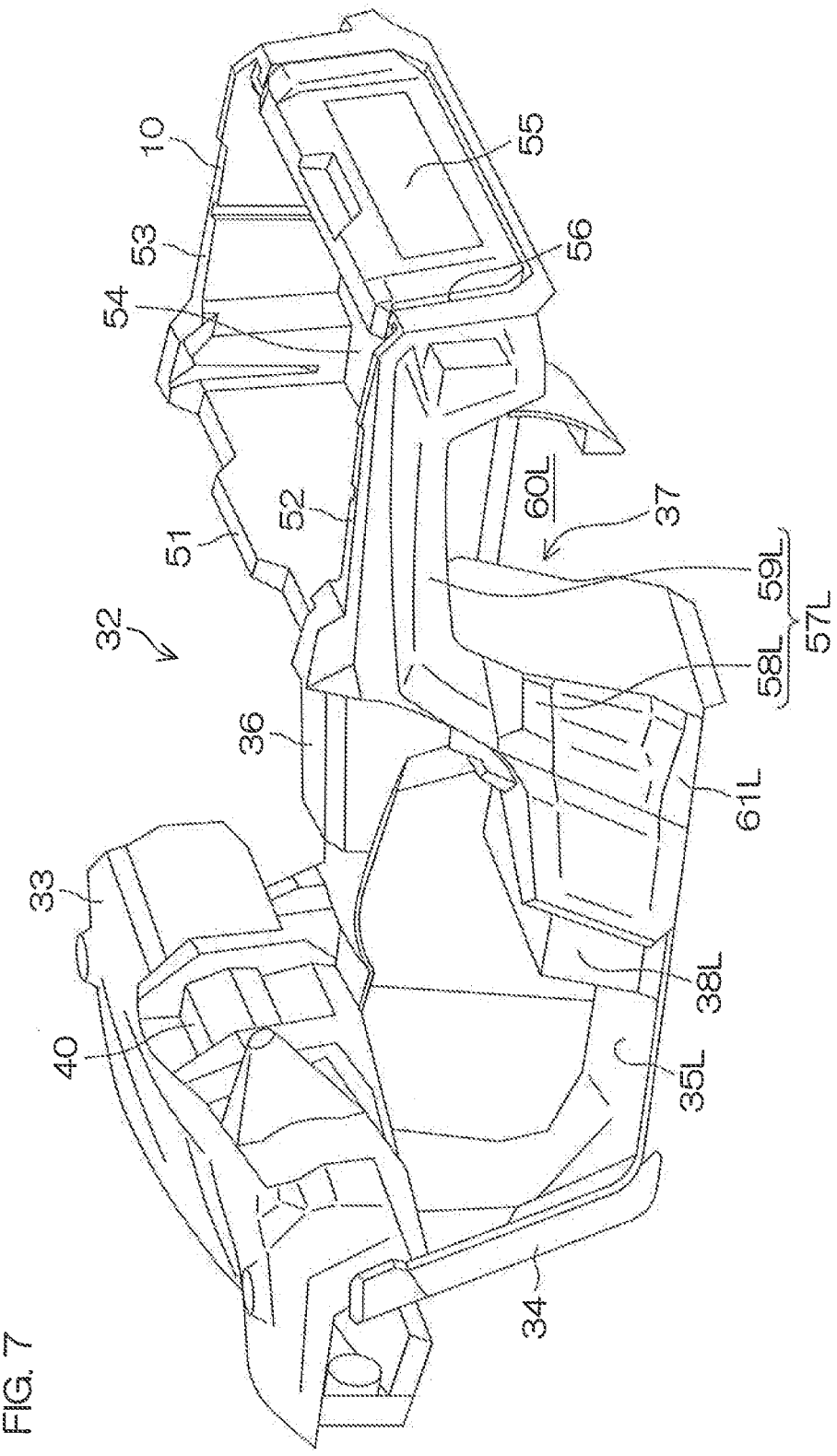
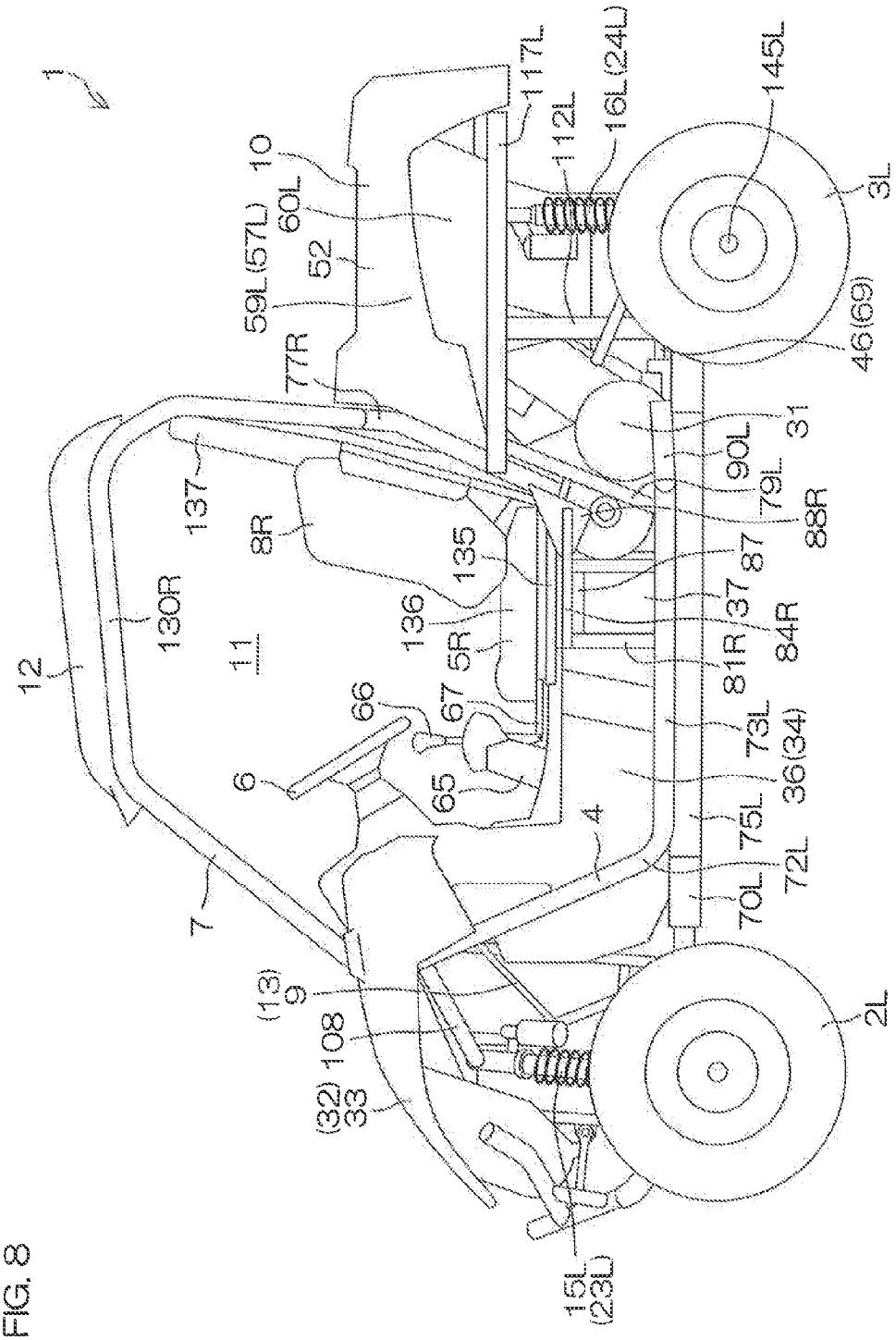


FIG. 7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3L
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59L (57L)
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79L
88R
137
8R
135
87
37
84R
130R
11
136
5R
81R
12
66
67
73L
36 (34)
6
65
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75L
72L
70L
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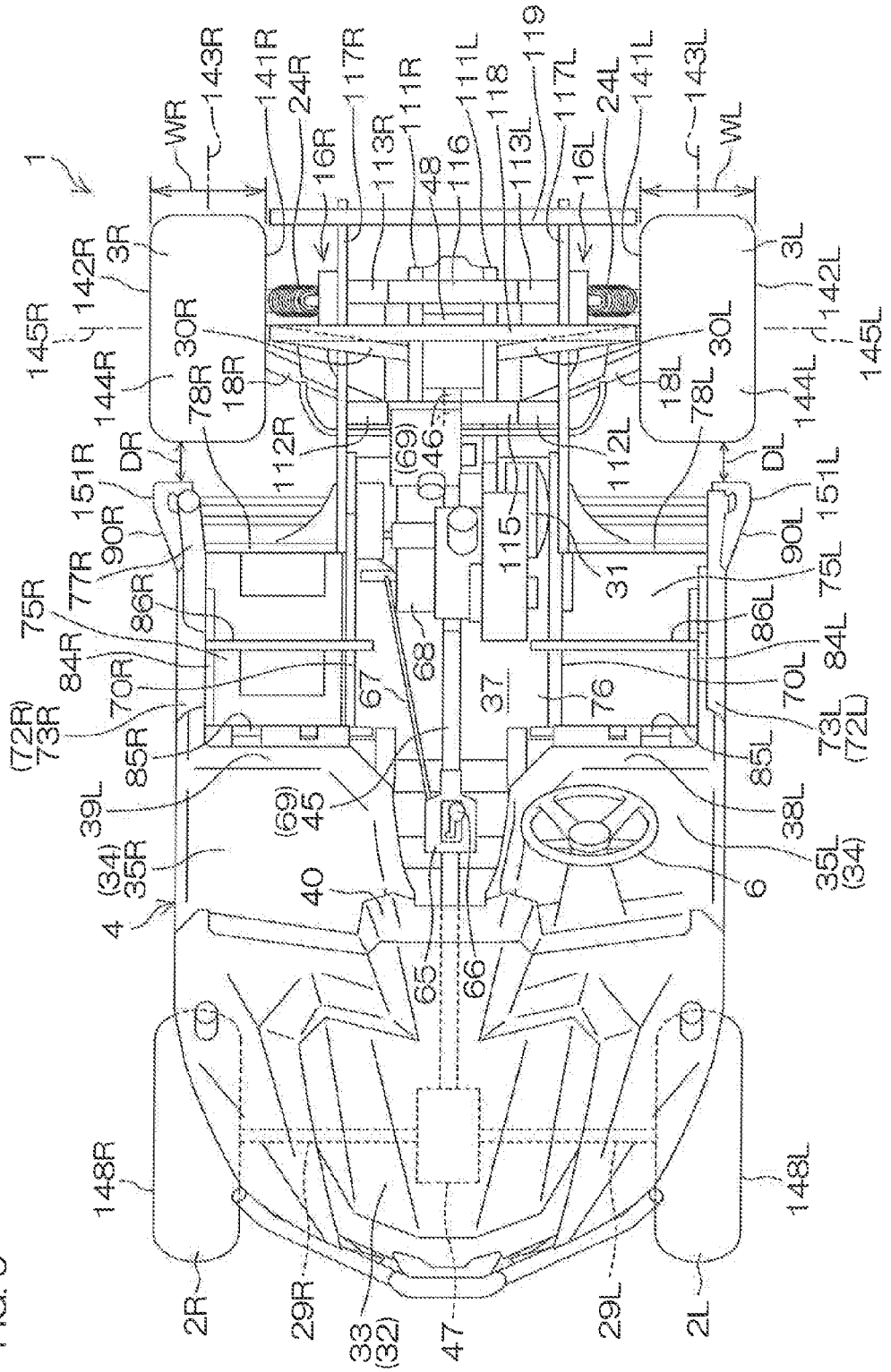
(13)
9
108
(32)
33
2L
15L
(23L)

FIG. 8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111R
48
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16L
24L
141L
143L
WL
3R
142R
145R
144R
30R
78R
18R
112R
(69)
46
DR
151R
90R
77R
75R
84R
86R
70R
(72R)
73R
85R
39L
(34)
35R
4
40
(69)
45
67
68
37
76
115
31
112L
18L
78L
30L
144L
DL
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29L
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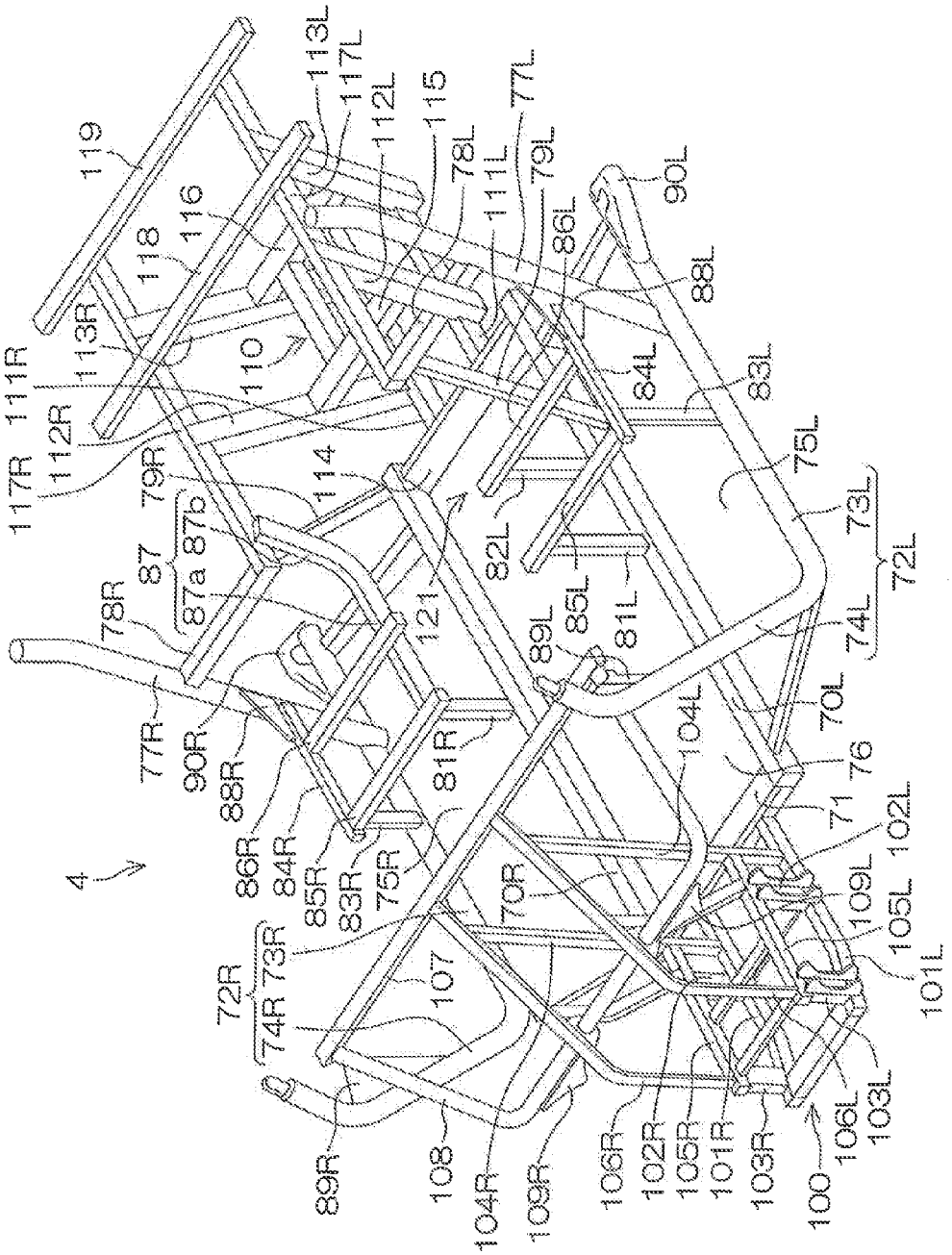
65
66

FIG. 9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103L
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104R
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109R
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113R
114
115
116
117L
117R
118
119
121
70L
70R
71
72L
72R
73L
73R
74L
74R
75L
75R
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77L
77R
78L
78R
79L
79R
81L
81R
82L
83L
83R
84L
84R
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85R
86L
86R
87
87a
87b
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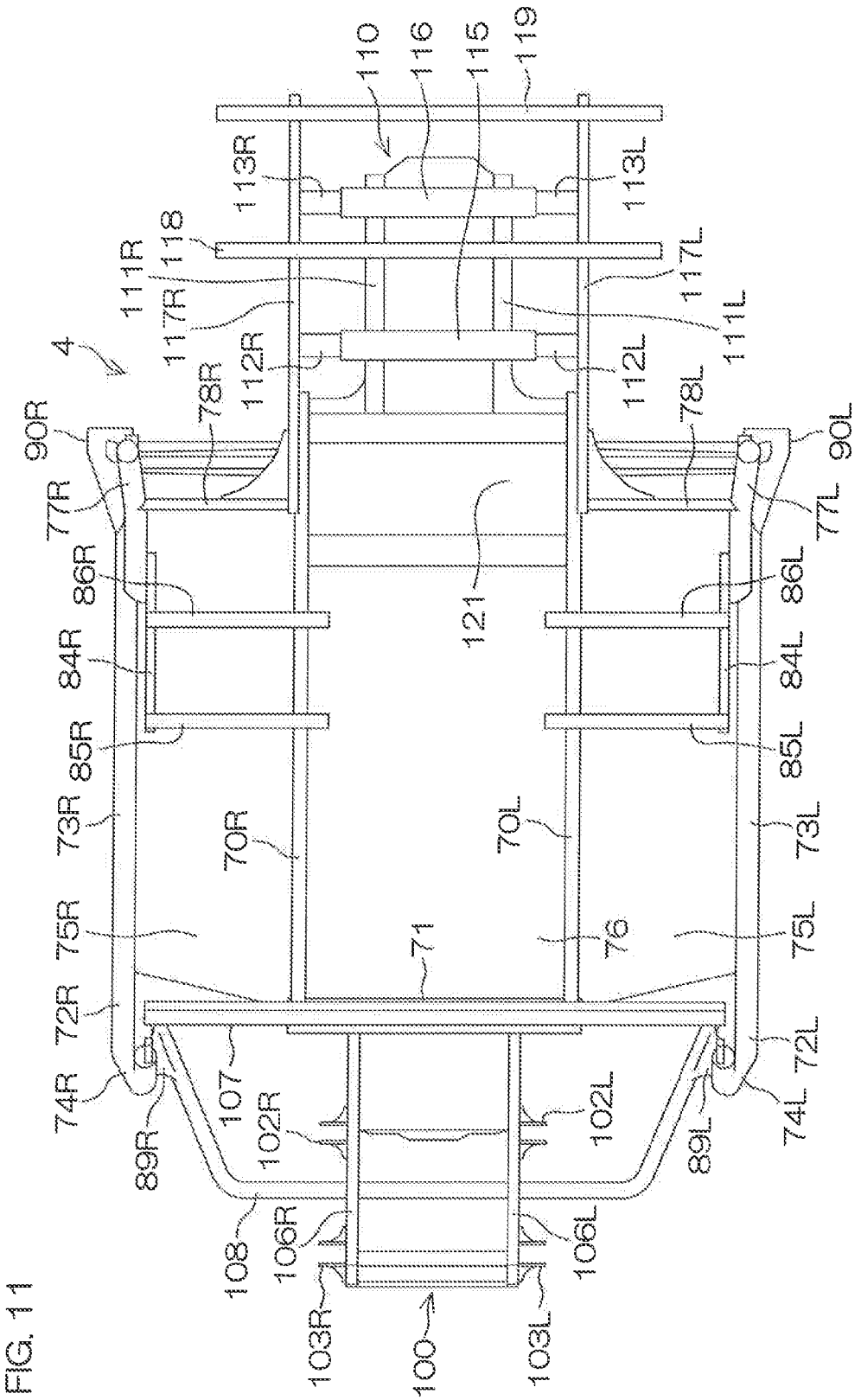
88R
89L
89R
90L
90R

FIG. 10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111L
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78R
78L
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121
86R
86L
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85R
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73R
73L
70R
70L
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71
76
72R
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102R
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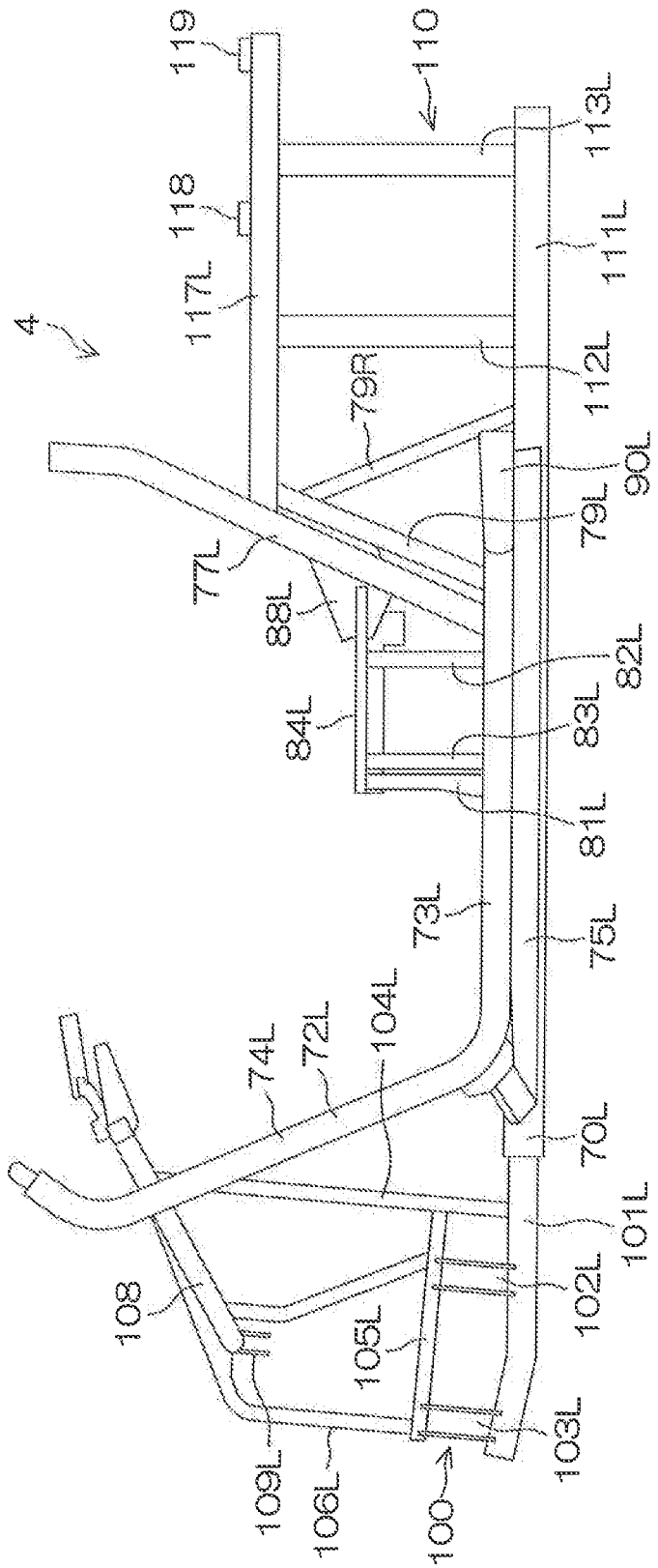
103L
100

FIG. 11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73L
75L
74L
72L
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101L
108
102L
105L
103L
109L
106L
100

FIG. 12

FIG. 13A

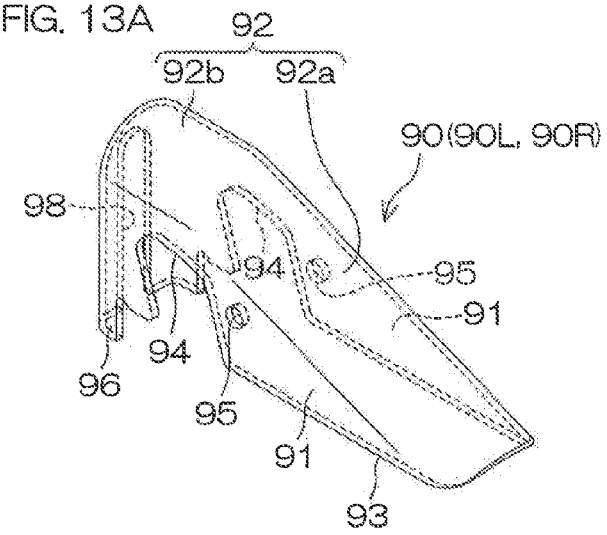


FIG. 13D

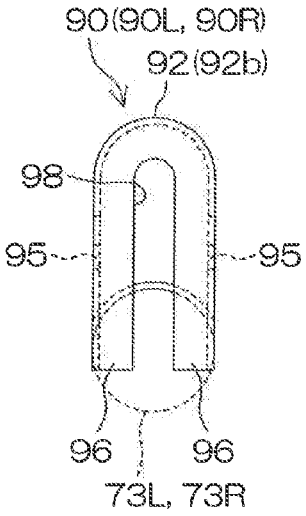


FIG. 13B

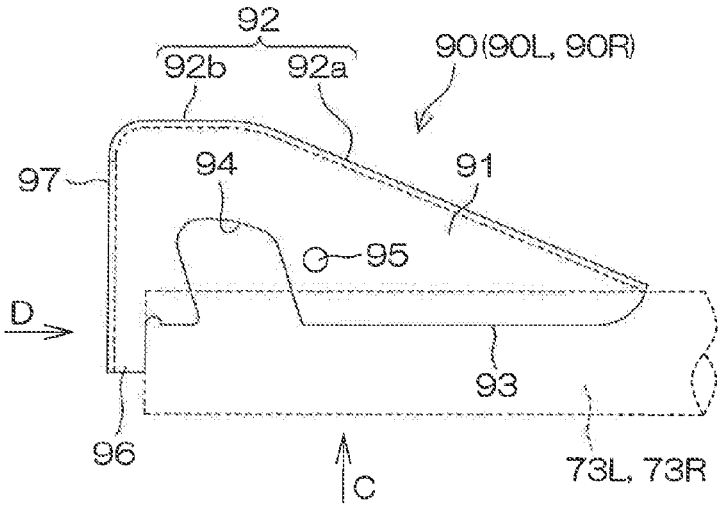


FIG. 13C

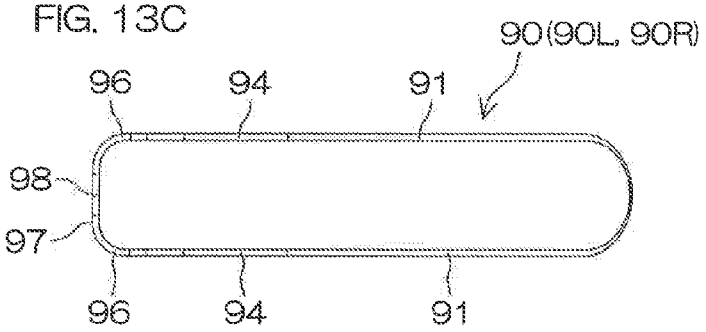


FIG. 14A

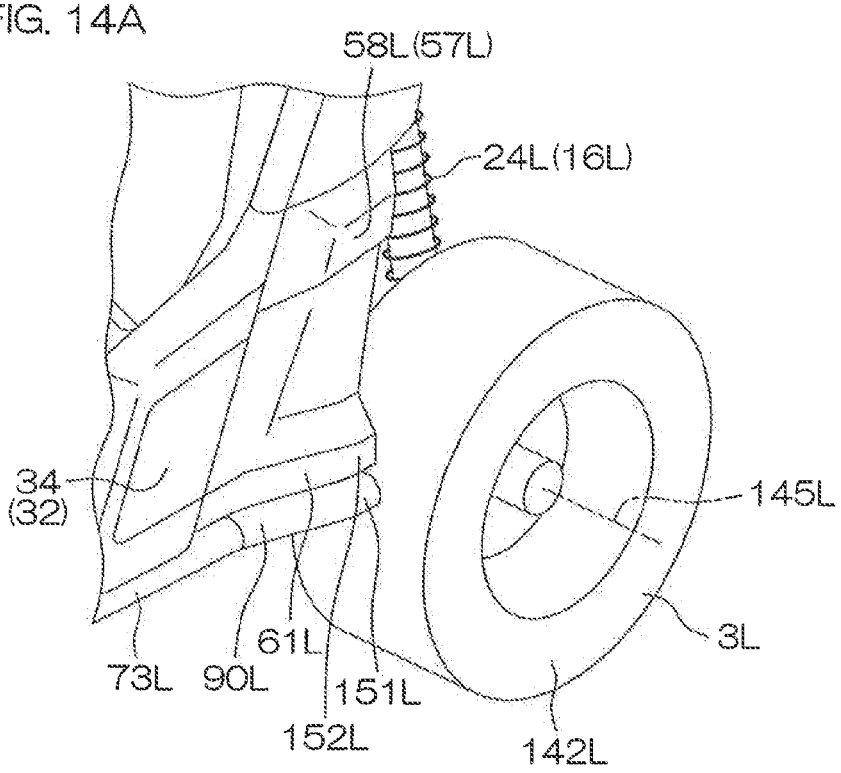
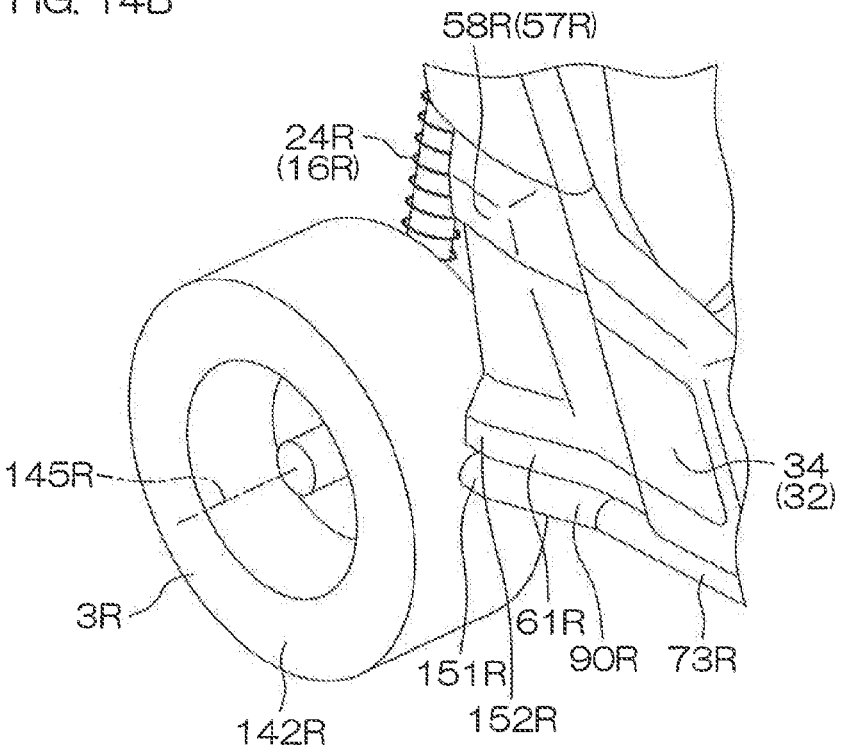


FIG. 14B



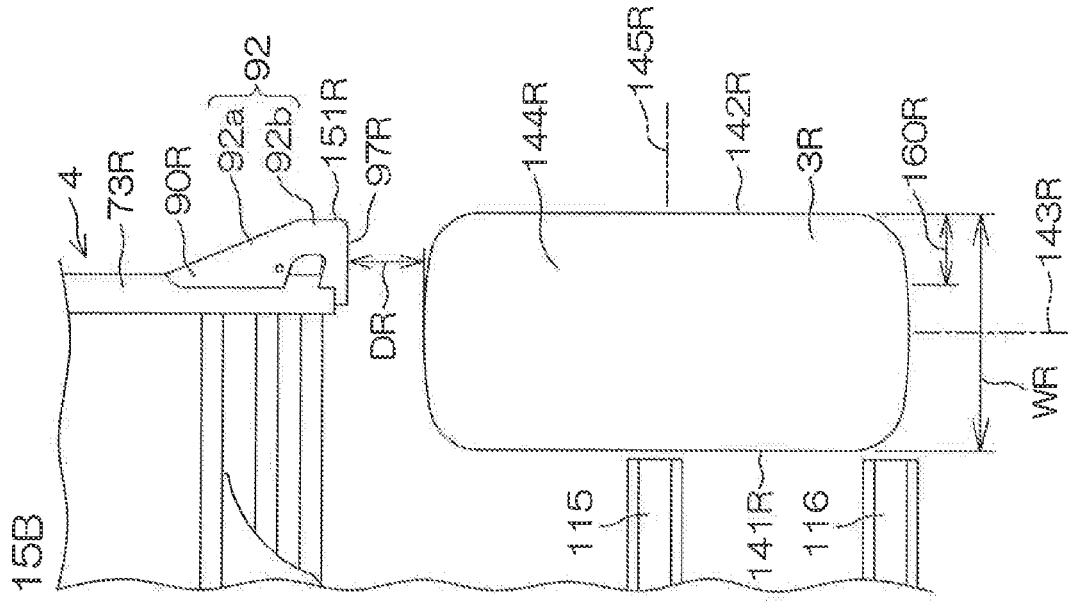


FIG. 15B

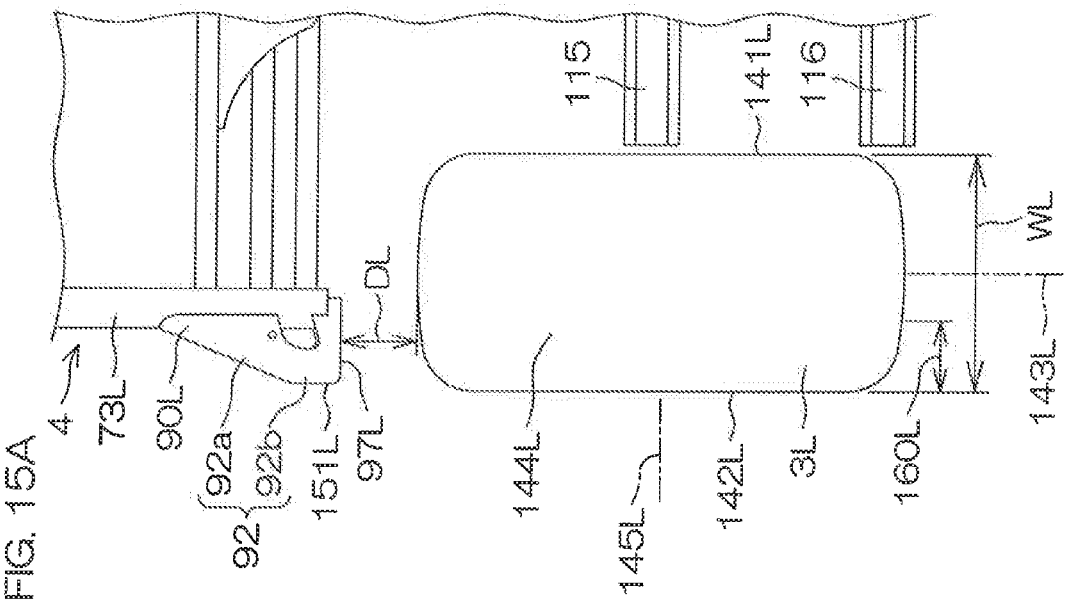


FIG. 15A

FIG. 16A

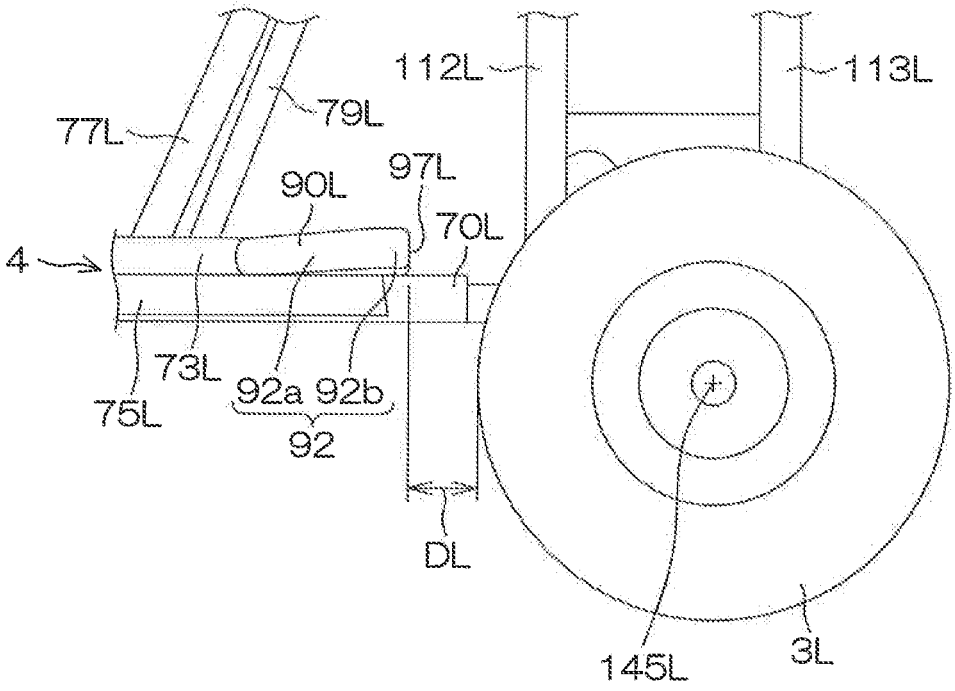
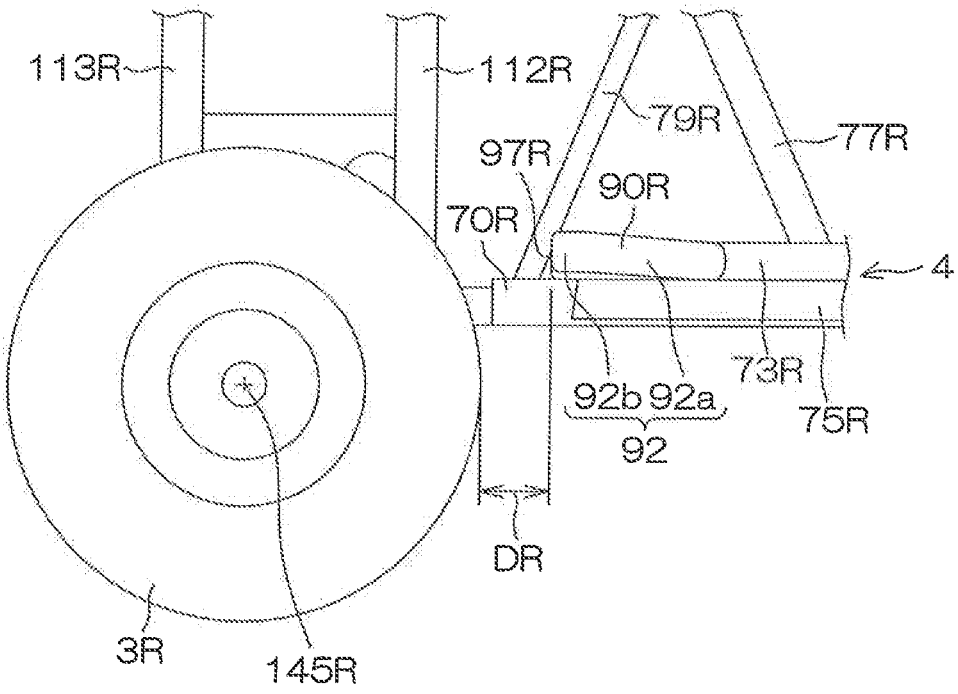


FIG. 16B



VEHICLE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a vehicle including a wheel and a frame supporting the same.

2. Description of the Related Art

US 2012/0031693 A1 discloses a side-by-side vehicle, which is within a category of a utility vehicle. The side-by-side vehicle includes a pair of left and right front wheels (104), a pair of left and right rear wheels (104), a frame (112) to which the four wheels are coupled, and a body panel (236) supported by the frame. The frame is positioned inside of an inner end of the pair of rear wheels. The body panel includes fender portions (552). Each of the fender portions covers a front side and an upper side of the corresponding rear wheel. The rear wheels are positioned outside of the fender portions, and the front wheels are positioned outside of the rear wheels. The body panel has a complicated shape, and is therefore generally manufactured from a resin material.

U.S. Pat. No. 5,251,713 discloses a four wheel vehicle in the form of an off road recreational vehicle. The vehicle includes a pair of front wheels (12), a pair of rear wheels (14), and a frame structure (10) supporting the wheels. The frame structure includes a pair of lower-side main frame tubes (18) and a pair of upper-side main frame tubes (16). The pair of lower-side main frame tubes are positioned inside of an inner end of the pair of rear wheels, and extend in a front-back direction. In the pair of upper-side main frame tubes, a distance between the pair of upper-side main frame tubes is the longest at an intermediate portion in the front-back direction, and a distance therebetween at a front end and a rear end is shorter than the above distance at the intermediate portion. As a result, the upper-side main frame tubes are inclined to expand outward toward the respective intermediate portions from the respective front ends, with respect to the front-back direction of a vehicle. The intermediate portions of the upper-side main frame tubes are positioned inside of the front wheels and the rear wheels.

SUMMARY OF THE INVENTION

The inventor of preferred embodiments of the present invention described and claimed in the present application conducted an extensive study and research regarding a vehicle, such as the one described above, and in doing so, discovered and first recognized new unique challenges and previously unrecognized possibilities for improvements as described in greater detail below.

In the vehicle in US 2012/0031693 A1, each of the fender portions covers the front side of the corresponding rear wheel. However, when the vehicle passes through a forest or a narrow place, an obstacle such as a tree may hit the fender portion or the rear wheel, and the fender portion or the rear wheels may be damaged.

In the main frame tubes at an upper side of the vehicle in U.S. Pat. No. 5,251,713, the intermediate portions expand outward. However, the intermediate portions do not sufficiently protrude outward of the vehicle, and besides, the distance to the rear wheels is long. Therefore, the intermediate portions do not protect the rear wheels.

A preferred embodiment of the present invention provides a vehicle including a left front wheel and a right front wheel arranged in a left-right direction of the vehicle, a left rear wheel and a right rear wheel arranged in the left-right direction of the vehicle and rearward of the left front wheel and the right front wheel, and a frame that rotatably supports the left front wheel, the right front wheel, the left rear wheel, and the right rear wheel. The frame includes a left frame portion and a right frame portion each extending in a front-back direction of the vehicle; a left protruded portion that is supported by the left frame portion, that protrudes to a left side with respect to the left frame portion, and that is arranged forward of the left rear wheel; and a right protruded portion that is supported by the right frame portion, that protrudes to a right side with respect to the right frame portion, and that is arranged forward of the right rear wheel. In a front view of the vehicle, from outside to inside, the left rear wheel, the left protruded portion, and the left front wheel are arranged in this order. Further, in the front view, from outside to inside, the right rear wheel, the right protruded portion, and the right front wheel are arranged in this order.

According to this arrangement, the left protruded portion is supported by the left frame portion extending in the front-back direction, and is arranged forward of the left rear wheel. The left protruded portion protrudes to a left side with respect to the left frame portion. Further, the right protruded portion is supported by the right frame portion extending in the front-back direction, and is arranged forward of the right rear wheel. The right protruded portion protrudes to a right side with respect to the right frame portion. The left protruded portion is positioned outside of the left front wheel, and the right protruded portion is positioned outside of the right front wheel.

The left protruded portion is positioned inside of the left rear wheel, and thus, the left frame portion is positioned inside of the left rear wheel. Similarly, the right protruded portion is positioned inside of the right rear wheel, and thus, the right frame portion is positioned inside of the right rear wheel. Therefore, a distance between the left frame portion and the right frame portion is shortened, and a compact vehicle body is achieved.

The left protruded portion is positioned forward of the left rear wheel and the right protruded portion is positioned forward of the right rear wheel, and thus, the left protruded portion and the right protruded portion are configured to hit an obstacle such as a tree or a rock before the rear wheels hit the obstacle to clear out the obstacle forward of the rear wheels. In this manner, a situation where the rear wheels are damaged by the obstacle is avoided. The left protruded portion and the right protruded portion are each positioned outside of the left front wheel and the right front wheel, which effectively clears out the obstacle.

In a preferred embodiment of the present invention, the left frame portion extends linearly in the front-back direction between the left front wheel and the left rear wheel, the left protruded portion protrudes in a direction to cross a longitudinal direction of the left frame portion, the right frame portion extends linearly in the front-back direction between the right front wheel and the right rear wheel, and the right protruded portion protrudes in a direction to cross a longitudinal direction of the right frame portion. In this arrangement, the left protruded portion and the right protruded portion each protrude outward from the linearly extending left frame portion and right frame portion. Thus, forward of the rear wheels, the obstacle is, by the linear frame portions and the protruded portion corresponding thereto, guided to outside of the vehicle to be cleared out. Therefore, it is possible to effectively clear out the obstacle and to more reliably protect the rear wheels.

In a preferred embodiment of the present invention, the left protruded portion and the right protruded portion each include a tapered portion tapered outward toward a rear.

According to this arrangement, the provision of the tapered portions of the left protruded portion and the right protruded portion guides the obstacle to outside of the vehicle and the obstacle is effectively cleared out from forward of the rear wheels. As a result, it is possible to more reliably protect the rear wheels.

In a preferred embodiment of the present invention, the left frame portion, the right frame portion, the left protruded portion, and the right protruded portion are preferably made from metal. According to this arrangement, the frame portions and the protruded portions are made from metal and it is thus possible to more reliably clear out the obstacle from forward of the rear wheels.

In a preferred embodiment of the present invention, the left protruded portion is preferably welded to the left frame portion, and the right protruded portion is preferably welded to the right frame portion. According to this arrangement, the coupling between the protruded portion and the frame portion has sufficient strength so that it is possible to more reliably clear out the obstacle from forward of the rear wheels.

In a preferred embodiment of the present invention, in the front view, the outermost end of the left protruded portion is positioned within a left end region having a width, for example, about 30% of the entire width, in the left-right direction, of the left rear wheel, and in the front view, the outermost end of the right protruded portion is positioned within a right end region having a width, for example, about 30% of an entire width, in the left-right direction, of the right rear wheel. According to this arrangement, in the front view, a region having a width, in the left-right direction covering, for example, about 70% or more from inside of the rear wheel is protected by the frame. As a result, it is possible to more reliably protect the rear wheels.

In a preferred embodiment of the present invention, the left protruded portion is arranged at a height within a width, in an up-down direction of the vehicle, of the left rear wheel, and the right protruded portion is arranged at a height within a width, in the up-down direction, of the right rear wheel. According to this arrangement, the protruded portion is disposed at a height within a width, in the up-down direction, of the corresponding rear wheel, and thus it is possible to more reliably protect the corresponding rear wheel by the protruded portion.

The above and other elements, features, steps, characteristics and advantages of the present invention will become more apparent from the following detailed description of the preferred embodiments with reference to the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a vehicle according to a preferred embodiment of the present invention.

FIG. **2** is a left side view of the vehicle.

FIG. **3** is a front view of the vehicle.

FIG. **4** is a back view of the vehicle.

FIG. **5** is a plan view of the vehicle.

FIG. **6** is a plan view of the vehicle in a state where a roof is removed.

FIG. **7** is a perspective view of a body panel provided in the vehicle.

FIG. **8** is a side view showing an arrangement of an engine with a portion of the body panel removed.

FIG. **9** is a plan view showing an arrangement of an engine with a roof, a cargo bed, etc., removed.

FIG. **10** is a perspective view of a frame provided in the vehicle.

FIG. **11** is a plan view of the frame.

FIG. **12** is a left side view of the frame.

FIG. **13**A is a perspective view of a protruded frame portion. FIG. **13**B is a plan view of the protruded frame portion. FIG. **13**C is a side view of the protruded frame portion. FIG. **13**D is a back view of the protruded frame portion.

FIG. **14**A is a partially enlarged perspective view of a portion near a left rear wheel. FIG. **14**B is a partially enlarged perspective view of a portion near a right rear wheel.

FIG. **15**A is a partial plan view showing a positional relationship between the left rear wheel and the frame. FIG. **15**B is a partial plan view showing a positional relationship between the right rear wheel and the frame.

FIG. **16**A is a partial side view showing the positional relationship between the left rear wheel and the frame. FIG. **16**B is a partial side view showing the positional relationship between the right rear wheel and the frame.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the description of preferred embodiments below, front-back, left-right, and up-down are directions defined with reference to a viewpoint of a driver seated on a seat unit of a vehicle while facing a steering wheel. Further, the description is made with reference to a state where the vehicle is on a horizontal surface.

FIG. **1** is a perspective view of a vehicle according to a preferred embodiment of the present invention. FIG. **2** is a left side view of the vehicle, FIG. **3** is a front view thereof, FIG. **4** is a back view thereof, and FIG. **5** is a plan view thereof. FIG. **6** is a plan view of the vehicle in a state where a roof is removed.

A vehicle **1** of the present preferred embodiment belongs to a category of utility vehicles. More specifically, the vehicle **1** preferably is a four-wheel recreational off road vehicle, for example. The vehicle **1** includes a left front wheel **2**L and a right front wheel **2**R, a left rear wheel **3**L and a right rear wheel **3**R, a frame **4**, seat units **5**L and **5**R, a steering wheel **6**, a roll cage **7**, bolsters **8**L and **8**R, and a cargo bed **10**. The left front wheel **2**L and the right front wheel **2**R are arranged to the left and right, respectively. The left rear wheel **3**L and the right rear wheel **3**R are arranged rearward of the left front wheel **2**L and the right front wheel **2**R, respectively, and arranged to the left and right, respectively. The wheels **2**L, **2**R, **3**L, and **3**R each include a tire. The surface of the tire may be roughened in a block pattern to be suitable for running on an uneven ground.

The frame **4** is supported by the pair of front wheels **2**L and **2**R, and the pair of rear wheels **3**L and **3**R. The frame **4** supports the seat units **5**L and **5**R between the pair of front wheels **2**L, **2**R and the pair of rear wheels **3**L, **3**R. The steering wheel **6** is arranged forward of the seat units **5**L and **5**R. In the present preferred embodiment, the seat units **5**L and **5**R include the left seat unit **5**L and the right seat unit **5**R arranged to the left and right. One seat unit, which is the left seat unit **5**L in the present preferred embodiment, is a driver's seat where a driver is seated to face forward. The steering wheel **6** is arranged forward of the left seat unit **5**L. The steering wheel **6** is coupled to a steering shaft **9**. The steering shaft **9** is mounted on the frame **4** such that the steering shaft **9** is rotatable around an axis thereof.

At a left side of the left seat unit **5**L and at a right side of the right seat unit **5**R, a left bolster **8**L and a right bolster **8**R are provided, respectively. The left bolster **8**L is a plate-shaped member facing from the left side to a passenger (driver) seated on the left seat unit **5**L. The left bolster **8**L supports the passenger on the left seat unit **5**L from the left side. The right

bolster **8**R is a plate-shaped member facing from the right side to the passenger seated on the right seat unit **5**R. The right bolster **8**R supports the passenger on the right seat unit **5**R from the right side. The bolsters **8**L and **8**R are preferably made from a resin material, for example.

The roll cage **7** is attached to the frame **4**. The roll cage **7** surrounds the seat units **5**L and **5**R, and defines openings **11**, on left and right, respectively, through which the passenger gets in and out of the vehicle **1**. Above the roll cage **7**, a roof **12** is attached.

The cargo bed **10** is arranged rearward of the seat units **5**L and **5**R. The cargo bed **10** is supported by the frame **4**.

The vehicle **1** is further provided with left-front and right-front suspension assemblies **15**L and **15**R that suspend each of the pair of front wheels **2**L and **2**R, and left-rear and right-rear suspension assemblies **16**L and **16**R that suspend each of the pair of rear wheels **3**L and **3**R. The frame **4** is supported, via the suspension assemblies **15**L, **15**R, **16**L, and **16**R, by the pair of front wheels **2**L and **2**R and the pair of rear wheels **3**L and **3**R.

In the present preferred embodiment, the suspension assemblies **15**L, **15**R, **16**L, and **16**R are each preferably of the double wishbone type, for example.

Specifically, the front suspension assemblies **15**L and **15**R each include upper arms **17**L and **17**R and lower arms **19**L and **19**R arranged on the top and bottom. Outer ends of the upper arms **17**L and **17**R and the lower arms **19**L and **19**R are coupled to knuckle arms **21**L and **21**R of the corresponding front wheels **2**L and **2**R, respectively. Inner ends of the upper arms **17**L and **17**R and the lower arms **19**L and **19**R are coupled pivotably to the frame **4**. Near the outer ends of the upper arms **17**L and **17**R, lower ends of shock absorbers **23**L and **23**R are each coupled. Upper ends of the shock absorbers **23**L and **23**R are coupled to the frame **4**.

Each of the rear suspension assemblies **16**L and **16**R includes upper arms **18**L and **18**R and lower arms **20**L and **20**R arranged on the top and bottom. Outer ends of the upper arms **18**L and **18**R and the lower arms **20**L and **20**R are each coupled to knuckle arms (not shown) of the corresponding rear wheels **3**L and **3**R. Inner ends of the upper arms **18**L and **18**R and the lower arms **20**L and **20**R are coupled pivotably to the frame **4**. Near the outer ends of the lower arms **20**L and **20**R, lower ends of shock absorbers **24**L and **24**R are each coupled. Upper ends of the shock absorbers **24**L and **24**R are coupled to the frame **4**.

Although not shown in the figure, axles of the wheels **2**L, **2**R, **3**L, and **3**R are supported rotatably by the corresponding knuckle arms. To these axles, corresponding drive shafts **29**L, **29**R, **30**L, and **30**R are coupled, respectively, via a constant-velocity universal joint (not shown). Power from an engine **31**, which is a drive source, is transmitted to the drive shafts **29**L, **29**R, **30**L, and **30**R. The engine **31** is arranged between the seat units **5**L and **5**R and supported by the frame **4**.

Further, the vehicle **1** includes a body panel **32** attached to the frame **4**. In the present preferred embodiment, the body panel **32** is preferably made from a resin material. The body panel **32** includes a front cover **33** that covers a front portion of the vehicle **1** and a mid cover **34** that covers a central portion of the vehicle **1**. The cargo bed **10** is arranged rearward of the mid cover **34**. The front cover **33** covers the front suspension assemblies **15**L and **15**R. Further, the front cover **33** covers a steering mechanism **13** coupled to the steering wheel **6**. The steering mechanism **13** includes the steering shaft **9** coupled to the steering wheel **6**. Further, the steering mechanism **13** may include a rack and pinion mechanism **14** that converts the rotation of the steering shaft **9** into a linear motion in the left-right direction of the vehicle **1**, and a pair of tie rods **22**L and **22**R. The pair of tie rods **22**L and **22**R each couple both ends of a rack shaft of the rack and pinion mechanism **14** and the knuckle arms **21**L and **21**R.

FIG. **7** is a perspective view of the body panel **32**. The front portion of the mid cover **34** is coupled to the front cover **33**. Further, the rear portion of the mid cover **34** is coupled to the cargo bed **10**. The mid cover **34** includes a left floor portion **35**L and a right floor portion **35**R (see FIG. **6**) forward of the left seat unit **5**L and the right seat unit **5**R, respectively. Between the left floor portion **35**L and the right floor portion **35**R, an elevated portion **36** elevated upward is arranged to extend in the front-back direction. Below the elevated portion **36**, a tunnel space **37** (see FIG. **9** as well) is defined which penetrates in the front-back direction. The tunnel space **37** houses a drive force transmitting mechanism **69** used to transmit the drive force of the engine **31** to the four wheels **2**L, **2**R, **3**L, and **3**R (see FIG. **9**).

Rearward of the left floor portion **35**L and the right floor portion **35**R, raised portions **38**L and **38**R (see FIG. **9** as well) covering the lower spaces of the left seat unit **5**L and the right seat unit **5**R from the front and the lateral side are provided, respectively. An instrument support portion **40** is arranged forward of the left floor portion **35**L and the right floor portion **35**R. The instrument support portion **40** is raised upward. Instruments (not shown) are held on the instrument support portion **40**.

In the present preferred embodiment, the cargo bed **10** is preferably made from a resin material. The cargo bed **10** includes a front wall portion **51**, a left-side wall portion **52**, a right-side wall portion **53**, a bottom wall portion **54**, and a tail gate **55**. The front wall portion **51** is raised upward at the back of the seat units **5**L and **5**R, and extends in the left-right direction. The left-side wall portion **52** is integrally coupled to a left side edge of the front wall portion **51**, raised upward, and extends from the left side edge of the front wall portion **51** to the rear side. The right-side wall portion **53** is integrally coupled to a right side edge of the front wall portion **51**, raised upward, and extends from the right side edge of the front wall portion **51** to the rear side. The left-side wall portion **52** and the right-side wall portion **53** face each other in the left-right direction, and each includes a parallel or substantially parallel inner wall surface. The bottom wall portion **54** is integrally coupled to a lower edge of the front wall portion **51**, and extends from the lower edge of the front wall portion **51** toward the rear along or substantially along the horizontal surface. The bottom wall portion **54** preferably has a rectangular or substantially rectangular shape, and the left side edge is integrally coupled to the lower edge of the left-side wall portion **52** and the right side edge is integrally coupled to the lower edge of the right-side wall portion **53**. A rear opening **56** is provided between the rear end of the left-side wall portion **52** and the rear end of the right-side wall portion **53**. The tail gate **55** is attached removably between the rear end of the left-side wall portion **52** and the rear end of the right-side wall portion **53** so as to close the rear opening **56**.

The body panel **32** includes a left rear wheel fender **57**L that covers the left rear wheel **3**L, and a right rear wheel fender **57**R that covers the right rear wheel **3**R (see FIG. **4**, FIG. **5**, etc.).

The left rear wheel fender **57**L includes a first left fender portion **58**L provided at a rear left side of the mid cover **34** and a second left fender portion **59**L provided at a left side of the cargo bed **10**. The first left fender portion **58**L and the second left fender portion **59**L are coupled to define a left-rear-wheel house **60**L that covers the left rear wheel **3**L.

The first left fender portion **58**L includes a left protruded fender portion **61**L at a lower end. The left protruded fender

portion **61**L is positioned forward of the left rear wheel **3**L, and protrudes toward a left side or the outside of the vehicle **1**. The left protruded fender portion **61**L is preferably positioned at a height within the width, in the up-down direction, of the left rear wheel **3**L, in a state where the vehicle **1** is motionless on the horizontal surface as shown in FIG. **2**, FIG. **14**A, etc. In other words, the left protruded fender portion **61**L is preferably positioned at a height higher than the lower end of the left rear wheel **3**L and lower than the upper end thereof. More specifically, the left protruded fender portion **61**L is preferably positioned at a height higher than the rotation center **145**L of the left rear wheel **3**L and lower than the upper end thereof.

The second left fender portion **59**L bulges outward (to a left side) from a position lower than the upper edge of the left-side wall portion **52** of the cargo bed **10**. The second left fender portion **59**L is positioned above the left rear wheel **3**L, as viewed from the back (see FIG. **4**), and covers the left rear wheel **3**L from above. The inner edge of the second left fender portion **59**L is integrally coupled to the left-side wall portion **52** of the cargo bed **10**, and as viewed from the back, is positioned outside (at a left side) of an innermost end **141**L of the left rear wheel **3**L. The outer edge of the second left fender portion **59**L is positioned, as viewed from the back, inside of an outermost end **142**L of the left rear wheel **3**L. An outermost end **152**L (see FIG. **14**A) of the left protruded fender portion **61**L is positioned outside (at a left side) of the second left fender portion **59**L.

Similarly, as presented in FIG. **4**, the right rear wheel fender **57**R includes a first right fender portion **58**R defined at a rear right side of the mid cover **34** and a second right fender portion **59**R defined at a right side of the cargo bed **10**. The first right fender portion **58**R and the second right fender portion **59**R are coupled to define a right-rear wheel house **60**R covering the right rear wheel **3**R.

The first right fender portion **58**R includes a right protruded fender portion **61**R (see FIG. **14**B) at a lower end. The right protruded fender portion **61**R is positioned forward of the right rear wheel **3**R, and protrudes toward a right side or the outside of the vehicle **1**. The right protruded fender portion **61**R is preferably positioned at a height within the width, in the up-down direction, of the right rear wheel **3**R, in a state where the vehicle **1** is motionless on the horizontal surface as shown in FIG. **14**B. In other words, the right protruded fender portion **61**R is preferably positioned at a height higher than the lower end of the right rear wheel **3**R and lower than the upper end thereof. More specifically, the right protruded fender portion **61**R is preferably positioned at a height higher than the rotation center **145**R of the right rear wheel **3**R and lower than the upper end thereof.

The second right fender portion **59**R bulges outward (to the right side) from a position lower than the upper edge of the right-side wall portion **53** of the cargo bed **10**. The second right fender portion **59**R is positioned above the right rear wheel **3**R, as viewed from the back (see FIG. **4**), and covers the right rear wheel **3**R from above. The inner edge of the second right fender portion **59**R is integrally coupled to the right-side wall portion **53** of the cargo bed **10**, and as viewed from the back, is positioned outside (at the right side) of an innermost end **141**R of the right rear wheel **3**R. The outer edge of the second right fender portion **59**R is positioned, as viewed from the back, inside of an outermost end **142**R of the right rear wheel **3**R. An outermost end **152**R (see FIG. **14**B) of the right protruded fender portion **61**R is positioned outside (at a left side) of the second right fender portion **59**R.

FIG. **8** is a side view showing an arrangement of an engine **31** with a portion of the mid cover **34** removed. FIG. **9** is a plan view showing an arrangement of the engine **31** with the roof **12**, a portion of the mid cover **34**, and the cargo bed **10** removed.

The engine **31** is arranged forward of the rear suspension assemblies **16**L and **16**R, and is arranged at the center or substantially the center of the width of the vehicle **1** in the left-right direction. In the left-right direction, the engine **31** is arranged between the left seat unit **5**L and the right seat unit **5**R. The center of gravity of the engine **31** is located in line or substantially in line with backrests **137** of the left seat unit **5**L and the right seat unit **5**R. A transmission lever unit **65** is arranged between the left and right floor portions **35**L and **35**R.

The transmission lever unit **65** includes a transmission lever **66** arranged to be operated by a driver. One end (front end) of an operation rod **67** is coupled to the transmission lever **66**. The other end (rear end) of the operation rod **67** is coupled to a transmission unit **68** attached to the engine **31**. The transmission unit **68** changes an output rotation speed of the engine **31** with a gear ratio of a gear stage selected from a plurality of gear stages. The rotation changed in speed is transmitted to the drive shafts **29**L, **29**R, **30**L, and **30**R via the drive force transmitting mechanism **69**.

The drive force transmitting mechanism **69** includes a front propeller shaft **45**, a rear propeller shaft **46**, a front differential device **47**, and a rear differential device **48**. The front propeller shaft **45** and the rear propeller shaft **46** are output shafts of the transmission unit **68**, and transmit the torque of the engine **31**. The front propeller shaft **45** extends forward from the transmission unit **68**, and the front differential device **47** is coupled to a front end of the front propeller shaft **45**. The front differential device **47** transmits the torque from the front propeller shaft **45** to drive shafts **29**L and **29**R while permitting a rotation difference between the drive shafts **29**L and **29**R. The rear propeller shaft **46** extends rearward from the transmission unit **68**, and the rear differential device **48** is coupled to a rear end of the rear propeller shaft **46**. The rear differential device **48** transmits the torque from the rear propeller shaft **46** to drive shafts **30**L and **30**R while permitting a rotation difference between the drive shafts **30**L and **30**R.

FIG. **10** is a perspective view of the frame **4**, FIG. **11** is a plan view thereof, and FIG. **12** is a left side view thereof.

The frame **4** is preferably made from a metal material. The metal material may include iron, for example. Another metal material such as aluminum may be used.

The frame **4** includes a left side frame portion **70**L and a right side frame portion **70**R extending in the front-back direction. The left side frame portion **70**L and the right side frame portion **70**R are parallel or substantially parallel to each other. A cross member **71** extending in the left-right direction is provided, and front ends of the left and right side frame portions **70**L and **70**R are connected to the cross member **71**. A left support frame portion **72**L is spaced a distance outside (at a left side) of the left side frame portion **70**L. Further, a right support frame portion **72**R is spaced a distance outside (at a right side) of the right side frame portion **70**R. The left support frame portion **72**L and the right support frame portion **72**R preferably are each L-shaped or substantially L-shaped, are arranged parallel or substantially parallel to each other, and face to each other in the left-right direction. The left support frame portion **72**L includes a left frame portion **73**L linearly extending in the front-back direction, and a left raised frame portion **74**L obliquely extending from the front end of the left frame portion **73**L toward a forward direction and an upward direction of the left frame portion **73**L. Similarly, the right support frame portion **72**R includes a right frame portion **73**R linearly extending in the front-back direction, and a

right raised frame portion **74**R obliquely extending from the front end of the right frame portion **73**R toward a forward direction and an upward direction of the right frame portion **73**R. The left frame portion **73**L is coupled to the left side frame portion **70**L via a left plate frame portion **75**L. The right frame portion **73**R is coupled to the right side frame portion **70**R via a right plate frame portion **75**R.

The left side frame portion **70**L and the right side frame portion **70**R are coupled to each other by a central plate frame portion **76**. The central plate frame portion **76** is disposed along or substantially along a horizontal surface. The left plate frame portion **75**L is inclined to extend upward and toward a left direction. The right plate frame portion **75**R is inclined to extend upward and toward a right direction. The left frame portion **73**L and the right frame portion **73**R are arranged at a position higher than the central plate frame portion **76**. The left frame portion **73**L and the right frame portion **73**R face each other in the left-right direction, and are disposed at an equal height.

A left support frame portion **77**L and a right support frame portion **77**R are each provided to obliquely extend upward and rearward from the intermediate portions of the left frame portion **73**L and the right frame portion **73**R. The substantially center portions of the support frame portions **77**L and **77**R are linked to outer ends of cross members **78**L and **78**R extending in the left-right direction, respectively. A pair of support frame portions **79**L and **79**R are provided to link the cross members **78**L, **78**R and the left and right side frame portions **70**L, **70**R. The left support frame portion **79**L obliquely extends upward and rearward from the intermediate portion of the left side frame portion **70**L. The right support frame portion **79**R obliquely extends upward and forward from the rear end of the right side frame portion **70**R.

To support the left seat unit **5**L, the frame **4** includes vertical support frame portions **81**L, **82**L, and **83**L, and horizontal support frame portions **84**L, **85**L, and **86**L. The left seat unit **5**L is supported by being coupled to the horizontal support frame portions **85**L and **86**L and a linkage member **88**L.

To support the right seat unit **5**R, the frame **4** includes vertical support frame portions **81**R and **83**R, horizontal support frame portions **84**R, **85**R, and **86**R, and an L-shaped or substantially L-shaped support frame portion **87**. The L-shaped or substantially L-shaped support frame portion **87** includes a horizontal portion **87***a* horizontally extending in the front-back direction and a raised portion **87***b* raised from the rear end toward an obliquely rear direction. The right seat unit **5**R is supported by being coupled to the horizontal support frame portions **85**R and **86**R and a linkage member **88**R.

A rear end of the left frame portion **73**L extends to a rear side with respect to the left plate frame portion **75**L. A left protruded frame portion **90**L is coupled to the rear end of the left frame portion **73**L. The left protruded frame portion **90**L is an example of a left protruded portion according to a preferred embodiment of the present invention. The left protruded frame portion **90**L is preferably welded to the left frame portion **73**L, for example. The left protruded frame portion **90**L protrudes outward (to a left side) of the left frame portion **73**L. Similarly, a rear end of the right frame portion **73**R extends to a rear side with respect to the right plate frame portion **75**R. A right protruded frame portion **90**R is coupled to the rear end of the right frame portion **73**R. The right protruded frame portion **90**R is an example of a right protruded portion according to a preferred embodiment of the present invention. The right protruded frame portion **90**R is preferably welded to the right frame portion **73**R, for example. The right protruded frame portion **90**R protrudes outward (to a right side) of the right frame portion **73**R. In the present preferred embodiment, the protruded frame portions **90**L and **90**R are positioned rearward of the seat units **5**L and **5**R.

A front-wheel holding portion **100** is arranged forward of the left and right side frame portions **70**L and **70**R. The front-wheel holding portion **100** holds the front wheels **2**L and **2**R via the front suspension assemblies **15**L and **15**R. The front-wheel holding portion **100** includes a pair of side frame portions **101**L and **101**R extending from the cross member **71** toward a forward direction. The front-wheel holding portion **100** further includes a pair of support frame portions **102**L and **102**R each raised upward from the intermediate portions of the pair of side frame portions **101**L and **101**R. The front-wheel holding portion **100** further includes a pair of support frame portions **103**L and **103**R each raised upward from the front end of the pair of side frame portions **101**L and **101**R. The inner ends of the lower arm **19**L of the left front suspension assembly **15**L are pivotably coupled to the lower ends of the support frame portions **102**L and **103**L, and the inner ends of the upper arm **17**L of the left front suspension assembly **15**L are pivotably coupled to the upper ends of the support frame portions **102**L and **103**L. Similarly, the inner ends of the lower arm **19**R of the right front suspension assembly **15**R are pivotably coupled to the lower ends of the support frame portions **102**R and **103**R, and the inner ends of the upper arm **17**R of the right front suspension assembly **15**R are pivotably coupled to the upper ends of the support frame portions **102**R and **103**R.

The front-wheel holding portion **100** further includes support frame portions **104**L and **104**R, side frame portions **105**L and **105**R, and support frame portions **106**L and **106**R. Rear ends of the support frame portions **106**L and **106**R are coupled to a cross member **107** extending in the left-right direction.

Both ends of U-shaped or substantially U-shaped frame **108** are coupled to both ends of the cross member **107**. The U-shaped or substantially U-shaped frame **108** is coupled to the intermediate portions of the support frame portions **106**L and **106**R. In the U-shaped or substantially U-shaped frame **108**, support members **109**L and **109**R are provided at positions outside of the support frame portions **106**L and **106**R. Upper ends of the shock absorbers **23**L and **23**R are pivotably coupled to the support members **109**L and **109**R. Both ends of the U-shaped or substantially U-shaped frame **108** are coupled by linkage members **89**L and **89**R to the left support frame portion **72**L and the right support frame portion **72**R, respectively.

A rear-wheel holding portion **110** is arranged rearward of the left and right side frame portions **70**L and **70**R. The rear-wheel holding portion **110** holds the rear wheels **3**L and **3**R via the rear suspension assemblies **16**L and **16**R. The rear-wheel holding portion **110** includes a pair of side frame portions **111**L and **111**R. The rear-wheel holding portion **110** further includes a pair of support frame portions **112**L and **112**R extending outward and obliquely upward from the front end of the side frame portions **111**L and **111**R. The rear-wheel holding portion **110** further includes a pair of support frame portions **113**L and **113**R extending outward and obliquely upward from the rear end of the side frame portions **111**L and **111**R. The rear ends of the left and right side frame portions **70**L and **70**R are coupled by a cross member **114** extending in the left and right, and the pair of side frame portions **111**L and **111**R extend rearward from the cross member **114**.

The inner ends of the lower arms **20**L and **20**R of the suspension assemblies **16**L and **16**R are pivotably coupled to the lower ends of the support frame portions **112**L, **112**R, **113**L, and **113**R. The inner ends of the upper arms **18**L and

18R are pivotably coupled to the intermediate portions of the support frame portions 112L, 112R, 113L, and 113R.

The rear-wheel holding portion 110 further includes a cross member 115, cross members 116, 118, and 119, and a pair of side frame portions 117L and 117R. Front ends of the side frame portions 117L and 117R are coupled to the inner ends of the cross members 78L and 78R, respectively. Rear ends of the side frame portions 117L and 117R are coupled to the cross member 118 which extends in the left-right direction at a position forward of the support frame portions 113L and 113R. Upper ends of the shock absorbers 24L and 24R are pivotably coupled to both ends of the cross member 118.

The cargo bed 10 is supported by the pair of side frame portions 117L and 117R. To the front end of the right-side side frame portions 117R, an upper end of the raised portion 87*b* of the L-shaped or substantially L-shaped support frame portion 87 is coupled.

An engine mount region 121 in which the engine 31 is mounted is set forward of the cross member 114 at a rear portion of the central plate frame portion 76.

As shown in FIG. 2, FIG. 4, FIG. 6, FIG. 8, etc., the roll cage 7 includes a pair of left and right side cage members 130L and 130R extending in the front-back direction, a pair of roof members 131 and 132 extending in the left-right direction, and a cross member 133 extending in the left-right direction.

The side cage members 130L and 130R are of a substantially reverse U-shaped or substantially reverse U-shaped, as viewed from its side. Front ends of the side cage members 130L and 130R are coupled to upper ends of the support frame portions 72L and 72R of the frame 4. Rear ends of the side cage members 130L and 130R are coupled to upper ends of the support frame portions 77L and 77R.

The roof members 131 and 132 extend in the left-right direction and couple upper portions of the side cage members 130L and 130R. The roof members 131 and 132 are arranged, one behind the other, with a space therebetween, face each other in the front-back direction, and are parallel or substantially parallel to each other.

The cross member 133 extends in the left-right direction to couple rear portions of the side cage members 130L and 130R. As best shown in FIG. 4, at a center portion in the left-right direction, the cross member 133 includes a crank-shaped portion 133*a* that is substantially U-shaped or substantially U-shaped which is recessed downward. A lower end of the crank-shaped portion 133*a* is coupled to the support member 134. The support member 134 is of a substantially reverse U-shaped or substantially reverse U-shaped, as viewed from rear. The crank-shaped portion 133*a* of the cross member 133 is coupled to an upper end of the support member 134. Two lower ends of the support member 134 are detachably coupled to the front ends of the side frame portions 117L and 117R (see FIG. 10).

The side cage members 130L and 130R and the support frame portions 72L and 72R define the openings 11 through which a passenger gets in and out in the left-right direction. The openings 11 communicate a passenger's occupying space with the outside. That is, the vehicle 1 is provided with an open occupying space and is not provided with a member defining a closed vehicle compartment.

The seat units 5L and 5R each include a seat frame 135, a seat 136, and the backrest 137. The seat 136 is coupled to the seat frame 135. The seat frame 135 is coupled to the horizontal support frame portions 85L, 86L; 85R, 85L of the frame 4. The backrest 137 is coupled, via the linkage members 88L and 88R (see FIG. 10), to the support frame portions 77L and 77R.

FIG. 13A is a perspective view of the protruded frame portion. FIG. 13B is a plan view thereof, FIG. 13C is a side view as viewed in a direction of an arrow C in FIG. 13B, and FIG. 13D is a back view as viewed in a direction of an arrow D in FIG. 13B.

In the present preferred embodiment, the left protruded frame portion 90L and the right protruded frame portion 90R preferably have a common structure, and the protruded frame portion 90 having a configuration shown in FIG. 13A to FIG. 13D is preferably commonly applied to the protruded frame portions 90L and 90R. In the present preferred embodiment, the protruded frame portion 90 is preferably manufactured by processing a metal plate, for example. The protruded frame portion 90 includes a pair of support plate portions 91 facing each other, and a guide portion 92 that couples the pair of support plate portions 91.

The support plate portion 91 is a flat plate having a trapezoidal or substantially trapezoidal shape in a plan view. Rearward of inner sides 93 of the support plate portion 91, an outward notch 94 is provided. Forward of the notch 94, a hole 95 that penetrates the support plate portion 91 is provided. The support plate portion 91 includes a protrusion 96 arranged rearward of the notch 94 and protruding inward of the inner side 93. A rear end edge 97 of the support plate portion 91 extends in the left-right direction. The inner side 93 is preferably welded to the left frame portion 73L of the frame 4 or to the right frame portion 73R thereof. The left frame portion 73L and the right frame portion 73R are each of tubular shape in this preferred embodiment.

The support plate portions 91 are positioned along or substantially along a horizontal surface when fixed to the left frame portion 73L or to the right frame portion 73R. As a result, the protruded frame portion 90 protrudes outward from the left frame portion 73L or the right frame portion 73R with the same or substantially the same height as those of the portions 73L and 73R. The direction into which the protruded frame portion 90 protrudes crosses the direction along which the left frame portion 73L or the right frame portion 73R extends. A protrusion 96 of the rear end edge 97 is positioned rearward of the rear end of the left frame portion 73L or the right frame portion 73R to partially cover the rear end thereof. The protrusion 96 is preferably welded to the rear end of the left frame portion 73L or the right frame portion 73R. The rear end edges 97 of the pair of support plate portions 91 are bent in a direction to come close to each other, and define a slot 98 extending in the left-right direction.

The guide portion 92 includes a tapered portion 92*a* extending in an obliquely outward rear direction, and a side surface portion 92*b* that is continuous with the rear end of the tapered portion 92*a* and extends in the front-back direction. A front end of the tapered portion 92*a* contacts an outside surface of the left frame portion 73L or the right frame portion 73R. A length in a front-back direction of the tapered portion 92*a* is longer than a length in a front-back direction of the side surface portion 92*b*. A length (width), in a left-right direction, of the tapered portion 92*a* is shorter than a length in a front-back direction of the tapered portion 92*a*. The tapered portion 92*a* linearly extends in a plan view. The side surface portion 92*b* linearly extends in a plan view.

FIG. 14A is an enlarged perspective view of a portion near the left rear wheel, and FIG. 14B is an enlarged perspective view of a portion near the right rear wheel. FIG. 15A is a plan view showing a positional relationship between the left rear wheel and the frame, and FIG. 15B is a plan view showing a positional relationship between the right rear wheel and the frame. FIG. 16A is a left side view showing a positional relationship between the left rear wheel and the frame, and

FIG. **16**B is a right side view showing a positional relationship between the right rear wheel and the frame.

The left frame portion **73**L is located at a left-right direction position within a range of a width, in the left-right direction, of the left rear wheel **3**L. That is, the left frame portion **73**L is positioned outside of the innermost end **141**L of the left rear wheel **3**L and inside of the outermost end **142**L of the left rear wheel **3**L. In the present preferred embodiment, the left frame portion **73**L is positioned outside of a left-right direction center position **143**L of the left rear wheel **3**L. The left protruded frame portion **90**L is positioned inside (at a right side) of the left rear wheel **3**L. More specifically, an outermost end **151**L of the left protruded frame portion **90**L is positioned slightly inside (at a right side) of the outermost end **142**L of the left rear wheel **3**L.

A length (specifically, a horizontal distance in a plan view) DL between the rear end edge **97**L of the left protruded frame portion **90**L and a surface **144**L of the left rear wheel **3**L is shorter than a width WL, in a left-right direction, of the left rear wheel **3**L. Thus, the rear end edge **97**L of the left protruded frame portion **90**L is sufficiently close to the left rear wheel **3**L.

The left protruded frame portion **90**L is positioned at a height within a range of a width in an up-down direction of the left rear wheel **3**L. The height of the left protruded frame portion **90**L is preferably proximate the height of the rotation center **145**L (axle) of the left rear wheel **3**L. The left rear suspension assembly **16**L varies the relationship in height between the left protruded frame portion **90**L and the left rear wheel **3**L while the vehicle **1** is running. It is preferable that when the vehicle **1** is motionless on a horizontal surface, the left protruded frame portion **90**L is positioned at a height within a range of a width, in the up-down direction, of the left rear wheel **3**L. It is more preferable that even when the relationship in height between the left protruded frame portion **90**L and the left rear wheel **3**L is changed while the vehicle **1** is running, the left protruded frame portion **90**L is positioned at a height within a range of a width, in the up-down direction, of the left rear wheel **3**L.

Similarly, the right frame portion **73**R is located at a left-right direction position within a range of a width, in the left-right direction, of the right rear wheel **3**R. That is, the right frame portion **73**R is positioned outside of the innermost end **141**R of the right rear wheel **3**R and inside of the outermost end **142**R of the right rear wheel **3**R. In the present preferred embodiment, the right frame portion **73**R is positioned outside of a left-right direction center position **143**R of the right rear wheel **3**R. The right protruded frame portion **90**R is positioned inside (at a left side) of the right rear wheel **3**R. More specifically, an outermost end **151**R of the right protruded frame portion **90**R is positioned slightly inside (at a left side) of the outermost end **142**R of the right rear wheel **3**R.

A length (specifically, a horizontal distance in a plan view) DR between the rear end edge **97**R of the right protruded frame portion **90**R and a surface **144**R of the right rear wheel **3**R is shorter than a width WR, in a left-right direction, of the right rear wheel **3**R. Thus, the rear end edge **97**R of the right protruded frame portion **90**R is sufficiently close to the right rear wheel **3**R.

The right protruded frame portion **90**R is positioned at a height within a range of a width in an up-down direction of the right rear wheel **3**R. The height of the right protruded frame portion **90**R is preferably proximate the height of the rotation center **145**R (axle) of the right rear wheel **3**R. The right rear suspension assembly **16**R varies the relationship in height between the right protruded frame portion **90**R and the right rear wheel **3**R while the vehicle **1** is running. It is preferable that when the vehicle **1** is motionless on a horizontal surface, the right protruded frame portion **90**R is positioned at a height within a range of a width, in the up-down direction, of the right rear wheel **3**R. It is more preferable that even when the relationship in height between the right protruded frame portion **90**R and the right rear wheel **3**R is changed while the vehicle **1** is running, the right protruded frame portion **90**R is positioned at a height within a range of a width, in the up-down direction, of the right rear wheel **3**R.

As shown in FIG. **14**A, the left protruded fender portion **61**L of the left rear wheel fender **57**L is positioned inside of the left protruded frame portion **90**L. More specifically, the outermost end **152**L of the left protruded fender portion **61**L (that is, the outermost end of the left rear wheel fender **57**L) lies inside of the outermost end **151**L of the left protruded frame portion **90**L.

Similarly, as shown in FIG. **14**B, the right protruded fender portion **61**R of the right rear wheel fender **57**R is positioned inside of the right protruded frame portion **90**R. More specifically, the outermost end **152**R of the right protruded fender portion **61**R (that is, the outermost end of the right rear wheel fender **57**R) lies inside of the outermost end **151**R of the right protruded frame portion **90**R.

As shown in FIG. **3**, in a front view, from outside to inside, the left rear wheel **3**L, the left protruded frame portion **90**L, and the left front wheel **2**L are arranged in this order. Similarly, in the front view, from outside to inside, the right rear wheel **3**R, the right protruded frame portion **90**R, and the right front wheel **2**R are arranged in this order. More specifically, in the front view, from outside to inside, the outermost end **142**L of the left rear wheel **3**L, the outermost end **151**L of the left protruded frame portion **90**L, and the outermost end **148**L of the left front wheel **2**L are arranged in this order. Further, in the front view, from outside to inside, the outermost end **142**R of the right rear wheel **3**R, the outermost end **151**R of the right protruded frame portion **90**R, and the outermost end **148**R of the right front wheel **2**R are arranged in this order.

As shown in FIG. **5**, FIG. **6**, FIG. **15**A, etc., in a plan view, from outside to inside, the left rear wheel **3**L, the left protruded frame portion **90**L, and the left rear wheel fender **57**L are arranged in this order. Further, similarly, in the plan view, from outside to inside, the right rear wheel **3**R, the right protruded frame portion **90**R, and the right rear wheel fender **57**R are arranged in this order. More specifically, in the plan view, from outside to inside, the outermost end **142**L of the left rear wheel **3**L, the outermost end **151**L of the left protruded frame portion **90**L, and the outermost end **152**L of the left rear wheel fender **57**L are arranged in this order. Similarly, in the plan view, from outside to inside, the outermost end **142**R of the right rear wheel **3**R, the outermost end **151**R of the right protruded frame portion **90**R, and the outermost end **142**L of the right rear wheel fender **57**R are arranged in this order.

Further, as shown in FIG. **6**, a distance between the outermost ends **142**L and **142**R of left and right rear wheels **3**L and **3**R is longer than a distance between the outermost ends **148**L and **148**R of the left and right front wheels **2**L and **2**R. Further, a distance between the outermost ends **151**L and **151**R of left and right protruded frame portions **90**L and **90**R is longer than a distance between the outermost ends **148**L and **148**R of the left and right front wheels **2**L and **2**R, and shorter than a distance between the outermost ends **142**L and **142**R of the left and right rear wheels **3**L and **3**R. Thus, with the protruded frame portions **90**L and **90**R, it is possible to prevent the rear wheels **3**L and **3**R from being damaged while maintaining the width of the vehicle **1** in a range not exceeding the outermost

ends **142**L and **142**R of the left and right rear wheels **3**L and **3**R. Therefore, it is possible to provide a compact, highly reliable vehicle **1**.

As described above, according to the configuration of the present preferred embodiment, the left protruded frame portion **90**L supported by the left frame portion **73**L is arranged forward of the left rear wheel **3**L, and protrudes toward the left side with respect to the left frame portion **73**L. Similarly, the right protruded frame portion **90**R supported by the right frame portion **73**R is arranged forward of the right rear wheel **3**R and protrudes toward the right side with respect to the right frame portion **73**R. Further, in the front view, from outside to inside, the left rear wheel **3**L, the left protruded frame portion **90**L, and the left front wheel **2**L are arranged in this order. Moreover, in the front view, from outside to inside, the right rear wheel **3**R, the right protruded frame portion **90**R, and the right front wheel **2**R are arranged in this order.

The left frame portion **73**L is positioned inside of the left rear wheel **3**L. Similarly, the right frame portion **73**R is positioned inside of the right rear wheel **3**R. Therefore, a distance between the left frame portion **73**L and the right frame portion **73**R is short, and a compact vehicle body is provided. In particular, it is possible to narrow the vehicle width to provide a vehicle capable of running on a narrow road.

The left protruded frame portion **90**L and the right protruded frame portion **90**R, which are positioned forward of the rear wheels **3**L and **3**R, first hit an obstacle such as a tree or a rock to clear out the obstacle from forward of the rear wheels **3**L and **3**R. In this way, it is possible to avoid a situation where the rear wheels **3**L and **3**R are damaged by the obstacle. The left protruded frame portion **90**L and the right protruded frame portion **90**R are each positioned outside of the left front wheel **2**L and the right front wheel **2**R, and it is thus possible to effectively clear out the obstacle.

Further, in the present preferred embodiment, the left protruded frame portion **90**L is provided at the rear end of the left frame portion **73**L, and the right protruded frame portion **90**R is provided at the rear end of the right frame portion **73**R. With this arrangement, it is possible to arrange the left protruded frame portion **90**L close to the left rear wheel **3**L, and it is possible to arrange the right protruded frame portion **90**R close to the right rear wheel **3**R. Therefore, immediately before each of the left rear wheel **3**L and the right rear wheel **3**R, the left protruded frame portion **90**L and the right protruded frame portion **90**R clear out the obstacle. As a result, it is possible to more reliably prevent damage to the left rear wheel **3**L and the right rear wheel **3**R.

Further, in the present preferred embodiment, the outermost end **151**L of the left protruded frame portion **90**L is positioned outside of the outermost end **148**L of the left front wheel **2**L. In other words, a left end of the left protruded frame portion **90**L is positioned at a left side with respect to a left end of the left front wheel **2**L. Similarly, the outermost end **151**R of the right protruded frame portion **90**R is positioned outside of the outermost end **148**R of the right front wheel **2**R. In other words, a right end of the right protruded frame portion **90**R is positioned at a right side with respect to a right end of the right front wheel **2**R. Therefore, the left protruded frame portion **90**L and the right protruded frame portion **90**R bulge sufficiently outward, and thus it is possible to reliably protect the rear wheels **3**L and **3**R from damage caused by the obstacle.

Further, in the present preferred embodiment, the left protruded frame portion **90**L and the right protruded frame portion **90**R each protrude outward from the linearly extending left frame portion **73**L and right frame portion **73**R. Thus, forward of the rear wheels **3**L and **3**R, the obstacle is guided to outside of the vehicle **1** to be cleared out by the linear frame portions **73**L and **73**R and the protruded frame portions **90**L and **90**R corresponding thereto. Therefore, it is possible to effectively clear out the obstacle and it is thus possible to more reliably protect the rear wheels **3**L and **3**R.

Further, in the present preferred embodiment, the left protruded frame portion **90**L protrudes outward at the same or substantially the same height as that of the linear left frame portion **73**L. Similarly, the right protruded frame portion **90**R protrudes outward at the same or substantially the same height as that of the linear right frame portion **73**R. Thus, it is possible to effectively clear out the obstacle outside of the vehicle **1** by the linear frame portions **73**L and **73**R and the protruded frame portions **90**L and **90**R having the same or substantially the same height as those of the frame portions **73**L and **73**R.

Further, in the present preferred embodiment, in a front view, the left frame portion **73**L is positioned within a range of a width, in the left-right direction, of the left front wheel **2**L and within a range of a width, in the left-right direction, of the left rear wheel **3**L. Further, in a front view, the right frame portion **73**R is positioned within a range of a width, in the left-right direction, of the right front wheel **2**R and within a range of a width, in the left-right direction, of the right rear wheel **3**R. Thus, the left frame portion **73**L and the right frame portion **73**R are provided with a small width, in the left-right direction, of the vehicle **1**. As a result, by such frame portions **73**L and **73**R having a small width in the left-right direction, and the protruded frame portions **90**L and **90**R corresponding thereto, the obstacle is guided to outside of the vehicle **1** to be cleared out forward of the rear wheels **3**L and **3**R. It is thus possible to effectively clear out the obstacle to more reliably protect the rear wheels **3**L and **3**R.

Further, in the present preferred embodiment, the left protruded frame portion **90**L includes the rear end edge **97**L extending in the left-right direction to face a front side of the left rear wheel **3**L, and the right protruded frame portion **90**R includes the rear end edge **97**R extending in the left-right direction to face a front side of the right rear wheel **3**R. Thus, it is possible to arrange the rear end edge **97**L of the left protruded frame portion **90**L close to the left rear wheel **3**L. Similarly, it is possible to arrange the rear end edge **97**R of the right protruded frame portion **90**R close to the right rear wheel **3**R. As a result, it is possible to more reliably clear out the obstacle appearing at the front of the rear wheel **3**R by the corresponding protruded frame portions **90**L and **90**R.

In addition, the left protruded frame portion **90**L and the right protruded frame portion **90**R each include the tapered portion **92***a* expanding outward toward the rear side. The provision of the tapered portion **92***a* guides the obstacle to outside of the vehicle **1** and the obstacle is effectively cleared out from forward of the rear wheels **3**L and **3**R. As a result, it is possible to more reliably protect the rear wheels **3**L and **3**R.

The left frame portion **73**L, the right frame portion **73**R, the left protruded frame portion **90**L, and the right protruded frame portion **90**R are made from a metal, and thus, it is possible to reliably clear out the obstacle from forward of the rear wheels **3**L and **3**R.

Further, the protruded frame portions **90**L and **90**R and the frame portions **73**L and **73**R are preferably rigidly coupled by welding, and thus, it is possible to reliably clear out the obstacle from forward of the rear wheels **3**L and **3**R.

Further, as understood from FIG. **8**, FIG. **9**, FIG. **15**A, FIG. **15**B, etc., in a front view, the outermost end **151**L of the left protruded frame portion **90**L is positioned preferably within the left end region **160**L of a width, for example, about 30% (more preferably about 20%) of the entire width, in the left-

right direction, of the left rear wheel **3**L. Similarly, in a front view, the outermost end **151**R of the right protruded frame portion **90**R preferably is positioned within the right end region **160**R of a width, for example, about 30% (more preferably about 20%) of the entire width, in the left-right direction, of the right rear wheel **3**R. Therefore, in a front view, a region of a width, in a left-right direction, preferably covering, for example, about 70% or more (more preferably about 80% or more) from inside of the rear wheels **3**L and **3**R is protected by the frame **4**. As a result, it is possible to reliably protect the rear wheels **3**L and **3**R.

Further, in the present preferred embodiment, the left protruded frame portion **90**L is positioned at a height within a width, in the up-down direction, of the left rear wheel **3**L. Similarly, the right protruded frame portion **90**R is positioned at a height within a width, in the up-down direction, of the right rear wheel **3**R. Therefore, it is possible to more reliably protect the corresponding rear wheels **3**L and **3**R by the protruded frame portions **90**L and **90**R.

Further, in the present preferred embodiment, the left protruded frame portion **90**L is positioned outside of the left rear wheel fender **57**L, and the right protruded frame portion **90**R is positioned outside of the right rear wheel fender **57**R. More specifically, the outermost end **151**L of the left protruded frame portion **90**L is positioned outside of the outermost end **152**L of the left rear wheel fender **57**L. In other words, a left end of the left protruded frame portion **90**L is positioned at a left side with respect to a left end of the left rear wheel fender **57**L. Similarly, the outermost end **151**R of the right protruded frame portion **90**R is positioned outside of the outermost end **152**R of the right rear wheel fender **57**R. In other words, a right end of the right protruded frame portion **90**R is positioned at a right side with respect to a right end of the right rear wheel fender **57**R. Therefore, the left protruded frame portion **90**L and the right protruded frame portion **90**R bulge sufficiently outward, and thus, the protruded frame portions **90**L and **90**R effectively clear out the obstacle from forward of the rear wheels **3**L and **3**R to protect the rear wheels **3**L and **3**R from damage.

Further, in the present preferred embodiment, a length DL, in the front-back direction, between the left rear wheel **3**L and the outermost end **151**L of the left protruded frame portion **90**L is shorter than the width WL, in the left-right direction, of the left rear wheel **3**L. Similarly, a length DR, in the front-back direction, between the right rear wheel **3**R and the outermost end **151**R of the right protruded frame portion **90**R is shorter than the width WR, in the left-right direction, of the right rear wheel **3**R. Thus, the left protruded frame portion **90**L is arranged at a position sufficiently close to the left rear wheel **3**L, at a front side of the left rear wheel **3**L. Similarly, the right protruded frame portion **90**R is arranged at a position sufficiently close to the right rear wheel **3**R, at a front side of the right rear wheel **3**R. Therefore, immediately before each of the left rear wheel **3**L and the right rear wheel **3**R, the left protruded frame portion **90**L and the right protruded frame portion **90**R clear out the obstacle. As a result, it is possible to reliably prevent damage to the left rear wheel **3**L and the right rear wheel **3**R.

Preferred embodiments of the present invention have been described above. However, as described below, the present invention may be implemented in other modes.

The left protruded frame portion **90**L may be arranged forward of the rear end of the left frame portion **73**L. Similarly, the right protruded frame portion **90**R may be arranged forward of the rear end of the right frame portion **73**R. However, it is preferable that the left protruded frame portion **90**L and the right protruded frame portion **90**R are arranged at symmetrical positions, that is, at an equal front-back direction position.

The left protruded frame portion **90**L and the right protruded frame portion **90**R do not necessarily need to have the same structure. Further, the protruded frame portions **90**L and **90**R may not necessarily be manufactured by processing a metal plate. For example, a protruded frame portion made from a pipe-shaped frame may be used.

For fixing the protruded frame portions **90**L and **90**R to the frame portions **73**L and **73**R, a structure other than welds may be used. For example, bolts may be used.

The rear end edges **97**L and **97**R of the protruded frame portions **90**L and **90**R may not necessarily need to extend along the left-right direction. That is, in a plan view, the rear end edges **97**L and **97**R may be inclined rearward and inward. Further, in a front view, the rear end edges **97**L and **97**R may be inclined to elevate or descend toward an inner side.

The protruded frame portions **90**L and **90**R may not necessarily include the tapered portion **92***a*. For example, in a plan view, the protruded frame portions **90**L and **90**R may have a rectangular shape or a substantially rectangular shape. Further, the protruded frame portions **90**L and **90**R may not necessarily include the side surface portion **92***b* parallel to the front-back direction. That is, for example, the entire guide portion **92** may be the tapered portion **92***a*. The shape of the tapered portion **92***a* of the protruded frame portions **90**L and **90**R may not necessarily be linear and may be a curved or a polygonal line.

In a plan view, the protruded frame portions **90**L and **90**R may not necessarily have a polygonal shape such as a trapezoidal shape, and, for example, the plan view shape thereof may have a partial circular shape or have a partial elliptical shape.

The left and right frame portions **73**L and **73**R may not necessarily strictly extend along the front-back direction of the vehicle **1**, and may be arranged such that a distance between the left and right frame portions **73**L and **73**R expands or narrows toward a rear. The left and right frame portions **73**L and **73**R may not necessarily be arranged horizontally, and may be disposed to be inclined to elevate or descend toward a rear. The left and right frame portions **73**L and **73**R may not necessarily be linear, and may include a curved portion.

The vehicle **1** preferably includes the two seat units **5**L and **5**R arranged to the left and right. However, the vehicle according to the present invention may include three or more seat units arranged in the left-right direction, or may include only one seat unit. Further, the vehicle may include two or more seat rows spaced apart in the front-back direction.

The vehicle **1** preferably includes the front differential device **47** and the rear differential device **48**. However, either one or both of the front differential device **47** and the rear differential device **48** may be omitted. Preferably, at least the front differential device **47** is provided. A differential lock mechanism to invalidate a function of either one or both of the front differential device **47** and the rear differential device **48** may be provided. The differential lock mechanism is useful for running on a road on which it is difficult to obtain traction such as a boggy area.

The vehicle **1** preferably includes the pair of front wheels **2**L and **2**R and the pair of rear wheels **3**L and **3**R. However, the vehicle may include two or more pairs of the front wheels and/or two or more pairs of the rear wheels.

The vehicle **1** preferably includes an internal combustion engine **31**. However, a drive source of the vehicle **1** may include an electric motor.

The vehicle **1** preferably belongs to a category of recreational off road vehicles, for example. However, the vehicle according to the present invention may be other types of vehicles belonging to the category of utility vehicles. Examples of such a utility vehicle include a side-by-side vehicle. Generally, the utility vehicle includes a frame structure and a wheel suitable for running off-road.

While preferred embodiments of the present invention have been described above, it is to be understood that variations and modifications will be apparent to those skilled in the art without departing from the scope and spirit of the present invention. The scope of the present invention, therefore, is to be determined solely by the following claims.

What is claimed is:

1. A vehicle comprising:

a left front wheel and a right front wheel arranged in a left-right direction of the vehicle;

a left rear wheel and a right rear wheel arranged in the left-right direction of the vehicle, and rearward of the left front wheel and the right front wheel; and

a frame configured to rotatably support the left front wheel, the right front wheel, the left rear wheel, and the right rear wheel; wherein

the frame includes:

a left frame portion and a right frame portion each extending in a front-back direction of the vehicle;

a left protruded portion that is supported by the left frame portion, that protrudes to a left side with respect to the left frame portion, and that is arranged forward of the left rear wheel; and

a right protruded portion that is supported by the right frame portion, that protrudes to a right side with respect to the right frame portion, and that is arranged forward of the right rear wheel;

the left rear wheel, the left protruded portion, and the left front wheel are arranged in this order from outside to inside in a front view of the vehicle; and

the right rear wheel, the right protruded portion, and the right front wheel are arranged in this order from outside to inside in the front view of the vehicle.

2. The vehicle according to claim **1**, wherein the left protruded portion is provided at a rear end of the left frame portion, and the right protruded portion is provided at a rear end of the right frame portion.

3. The vehicle according to claim **1**, wherein an outermost end of the left rear wheel, an outermost end of the left protruded portion, and an outermost end of the left front wheel are arranged in this order from outside to inside in the front view of the vehicle; and

an outermost end of the right rear wheel, an outermost end of the right protruded portion, and an outermost end of the right front wheel are arranged in this order from outside to inside in the front view of the vehicle.

4. The vehicle according to claim **1**, wherein the left frame portion extends linearly in the front-back direction between the left front wheel and the left rear wheel, and the left protruded portion protrudes in a direction to cross a longitudinal direction of the left frame portion; and

the right frame portion extends linearly in the front-back direction between the right front wheel and the right rear wheel, and the right protruded portion protrudes in a direction to cross a longitudinal direction of the right frame portion.

5. The vehicle according to claim **1**, wherein, in the front view, the left frame portion is positioned within a range of a width, in the left-right direction, of the left front wheel and within a range of a width, in the left-right direction, of the left rear wheel; and

in the front view, the right frame portion is positioned within a range of a width, in the left-right direction, of the right front wheel and within a range of a width, in the left-right direction, of the right rear wheel.

6. The vehicle according to claim **1**, wherein the left protruded portion includes a rear end edge extending in the left-right direction to face a front side of the left rear wheel; and

the right protruded portion includes a rear end edge extending in the left-right direction to face a front side of the right rear wheel.

7. The vehicle according to claim **1**, wherein the left protruded portion and the right protruded portion each include a tapered portion tapered outward toward a rear of the vehicle.

8. The vehicle according to claim **1**, wherein the left frame portion, the right frame portion, the left protruded portion, and the right protruded portion are made from metal.

9. The vehicle according to claim **8**, wherein the left protruded portion is welded to the left frame portion, and the right protruded portion is welded to the right frame portion.

10. The vehicle according to claim **1**, wherein, in the front view, an outermost end of the left protruded portion is positioned within a left end region having a width about 30% of an entire width, in the left-right direction, of the left rear wheel; and

in the front view, an outermost end of the right protruded portion is positioned within a right end region having a width about 30% of an entire width, in the left-right direction, of the right rear wheel.

11. The vehicle according to claim **1**, wherein the left protruded portion is disposed at a height within a width, in an up-down direction of the vehicle, of the left rear wheel; and

the right protruded portion is disposed at a height within a width, in the up-down direction of the vehicle, of the right rear wheel.

12. A vehicle comprising:

a left front wheel and a right front wheel arranged in a left-right direction of the vehicle;

a left rear wheel and a right rear wheel arranged in the left-right of the direction of the vehicle, and rearward of the left front wheel and the right front wheel; and

a frame configured to rotatably support the left front wheel, the right front wheel, the left rear wheel, and the right rear wheel;

a left rear wheel fender that is supported by the frame and covers at least a portion of the left rear wheel; and

a right rear wheel fender that is supported by the frame and covers at least a portion of the right rear wheel; wherein

the frame includes:

a left frame portion and a right frame portion each extending in a front-back direction of the vehicle;

a left protruded portion that is supported by the left frame portion, that protrudes to a left side with respect to the left frame portion, and that is arranged forward of the left rear wheel; and

a right protruded portion that is supported by the right frame portion, that protrudes to a right side with respect to the right frame portion, and that is arranged forward of the right rear wheel;

the left rear wheel, the left protruded portion, and the left rear wheel fender are arranged in this order from outside to inside in a plan view of the vehicle; and

the right rear wheel, the right protruded portion, and the right rear wheel fender are arranged in this order from outside to inside in the plan view of the vehicle.

13. The vehicle according to claim **12**, wherein the left protruded portion is provided at a rear end of the left frame portion, and the right protruded portion is provided at a rear end of the right frame portion.

14. The vehicle according to claim **12**, wherein an outermost end of the left rear wheel, an outermost end of the left protruded portion, and an outermost end of the left rear wheel fender are arranged in this order from outside to inside in the plan view of the vehicle; and

an outermost end of the right rear wheel, an outermost end of the right protruded portion, and an outermost end of the right rear wheel fender are arranged in this order from outside to inside in the plan view of the vehicle.

15. The vehicle according to claim **12**, wherein an outermost end of the left protruded portion is positioned at a left side with respect to an outermost end of the left rear wheel fender; and

an outermost end of the right protruded portion is positioned at a right side with respect to an outermost end of the right rear wheel fender.

16. The vehicle according to claim **12**, wherein, in a front view, the left frame portion is positioned within a range of a width, in the left-right direction, of the left front wheel and within a range of a width, in the left-right direction, of the left rear wheel; and

in the front view, the right frame portion is positioned within a range of a width, in the left-right direction, of the right front wheel and within a range of a width, in the left-right direction, of the right rear wheel.

17. The vehicle according to claim **12**, wherein the left protruded portion includes a rear end edge extending in the left-right direction to face a front side of the left rear wheel; and

the right protruded portion includes a rear end edge extending in the left-right direction to face a front side of the right rear wheel.

18. The vehicle according to claim **12**, wherein the left protruded portion and the right protruded portion each include a tapered portion tapered outward toward a rear.

19. The vehicle according to claim **12**, wherein the left frame portion, the right frame portion, the left protruded portion, and the right protruded portion are made from metal;

the left protruded portion is welded to the left frame portion; and

the right protruded portion is welded to the right frame portion.

20. The vehicle according to claim **12**, wherein, in a front view, an outermost end of the left protruded portion is positioned within a left end region having a width about 30% of an entire width, in the left-right direction, of the left rear wheel; and

in the front view, an outermost end of the right protruded portion is positioned within a right end region having a width about 30% of an entire width, in the left-right direction, of the right rear wheel.

21. A vehicle comprising:

a left front wheel and a right front wheel arranged in a left-right direction of the vehicle;

a left rear wheel and a right rear wheel arranged in a left-right direction of the vehicle, and rearward of the left front wheel and the right front wheel; and

a frame configured to rotatably support the left front wheel, the right front wheel, the left rear wheel, and the right rear wheel; wherein

the frame includes:

a left frame portion and a right frame portion each extending in a front-back direction of the vehicle;

a left protruded portion that is supported by the left frame portion, that protrudes to a left side with respect to the left frame portion, and that is arranged forward of the left rear wheel; and

a right protruded portion that is supported by the right frame portion, that protrudes to a right side with respect to the right frame portion, and that is arranged forward of the right rear wheel;

a length in the front-back direction between the left rear wheel and the outermost end of the left protruded portion is shorter than a width, in the left-right direction, of the left rear wheel;

a length in the front-back direction between the right rear wheel and the outermost end of the right protruded portion is shorter than a width, in the left-right direction, of the right rear wheel; and

an entire length of each of the left protruded portion and the right protruded portion in the front-back direction is substantially the same as or less than the width, in the left-right direction, of the left rear wheel and the right rear wheel, respectively.

22. The vehicle according to claim **21**, wherein, in a front view, the left frame portion is positioned within a range of a width, in the left-right direction, of the left front wheel and within a range of a width, in the left-right direction, of the left rear wheel; and

in the front view, the right frame portion is positioned within a range of a width, in the left-right direction, of the right front wheel and within a range of a width, in the left-right direction, of the right rear wheel.

23. The vehicle according to claim **21**, wherein the left protruded portion includes a rear end edge extending in the left-right direction to face a front side of the left rear wheel; and

the right protruded portion includes a rear end edge extending in the left-right direction to face a front side of the right rear wheel.

24. The vehicle according to claim **21**, wherein the left protruded portion and the right protruded portion each include a tapered portion tapered outward toward a rear.

25. The vehicle according to claim **21**, wherein the left frame portion, the right frame portion, the left protruded portion, and the right protruded portion are made from metal;

the left protruded portion is welded to the left frame portion; and

the right protruded portion is welded to the right frame portion.

26. The vehicle according to claim **21**, wherein, in a front view, an outermost end of the left protruded portion is positioned within a left end region having a width about 30% of an entire width, in the left-right direction, of the left rear wheel; and

in the front view, an outermost end of the right protruded portion is positioned within a right end region having a width about 30% of an entire width, in the left-right direction, of the right rear wheel.

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